THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

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IRON AND STEEL INDUSTRY, THE MACHINERY TRADE AND KINDRED INTERESTS

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CLEVELAND, O., AUGUST 7, 1890.

THE WEEK IN IRON CIRCLES.

General Features. While the passage of the Silver Bill has not yet had time to affect the general iron market, disappointment is expressed in some quarters that prices did not advance immediately all along the line. It is now felt that the heavy shipments of gold abroad will counteract the favorable tendency of this measure, and that for the present there is nothing to affect the market, other than the natural demand for iron, which at this writing is very large. The opening of the Fall buying has commenced at Louisville with purchases being made specially for mottled and white by rolling mills to bridge over the hot weather. At the same time orders are being placed for deliveries running through this year and for the first six months of next. The sales so far have not been large, but it is thought the coming week will witness the placing of large orders on the part of the pipe men, followed by general sales for extended deliveries. It is not thought there will be any marked advance, but that sales will be largely based on present prices, but these will tend to advance prices and probably 50 cents a ton more will be asked of late purchasers. There are several new furnaces that will go in blast during the next thirty days in the South, but their output has been anticipated and commented upon for a long time, so that their effect has already been discounted. It is thought the present moment is a favorable one to make to make purchases and there certainly is no danger for buyers when prices are at the present low point. The past week has given the usual amount of midsummer buying at Chicago, few sales having been made for anything but small quantities, business placed as a rule being for early deliveries. Prices in all lines are well maintained and firmness characterizes the market in this respect. The outlook for Autumn business continues good and present indications all point to general activity in iron and steel circles during the remainder of the year. There has been no buying of large amounts at Detroit, but quite a brisk trade in one and two car load orders. From the inquiries received it is very evident that the large buyers of Lake Superior charcoal who have not already contracted for their season's supply, are now about ready to do so. The general opinion among furnacemen appears to be that these orders will take up the entire balance of their output for the year. Several furnaces are compelled to receive orders at full prices from regular customers, for they cannot make deliveries before the close of navigation on the lakes. The recent advance made by Southern furnaces is being well maintained, as is also the advance in first-class silveries. Consumption still continues very large, and deliveries are being called for faster than specified in the original contract. Business in pig iron at Buffalo has been quiet, but prices are generally firm, especially is this so among furnaces making Lake Superior strong iron. Ohio silvery softeners have been offered at very low figures, apparently to force sales, but with few exceptions prices were maintained. Sales at St. Louis are of a very limited character, following the customary conditions of the business at this time of year. In the meantime consumers are very busy and many of them are using up iron faster than they anticipated. Southern furnaces generally claim to be well sold up, and some of them are decidedly backward in shipments of certain grades. The market for pig iron at Cincinnati has been quiet during the past week, but the aggregate of small orders has been considerable, and large buyers have made inquiries with the intention of placing contracts for a year's supply. Charcoal irons have shared with coke brands in the week's business in greater proportion. The situation remains much the same at Pittsburgh. There has been some advance in certain kinds of manufactured iron, but thus far the improvement has not affected pig iron. Our English correspondents, S. W. Royse & Co., of Manchester, write under date of July 26: "Although the promise at the end of the last month has scarcely been fulfilled, there is no reason for dissatisfaction with the present course of affairs in the pig iron markets. Prices have indeed not advanced to any great extent, but still they are better than at the end of the month, and although Middlesbrough shipments have fallen off somewhat, the general feeling is distinctly one of confidence in the future. This better tone is having a beneficial effect upon the manufactured iron trade, the demand in which is better and prices firmer."

Iron Ore. The recent delay in the forwarding of ore through the accident to the lock in the "Soo" is important, not so much on account of the damage already inflicted, but because it foreshadows further and more serious possibilities in this direction, and illustrates what might happen if some accident should occur that should close the "Soo" for sixty or ninety days instead of four. As it is, the damage to the trade, by reason of the delay, and for which there is no remedy, will approximate a quarter of a million dollars. The past week, in marked distinction from its predecessors, has shown unusual activity in the market, and chiefly so because of the breaking of prices in the non-Bessemer lines. The grand total of sales considerably exceeds 250,000 tons, including one 100,000-ton lot for Pittsburgh, and a number of lots ranging from 20,000 to 40,000 tons. Chicago bought largely, as did several adjacent Valley districts, and the East took some ore as well. Several additional sales are about to be closed up, and this will about finish up the stocks of non-Bessemers for the next sixty days, unless the production should very much overrun all previous estimates. The advance in ore prices, last Fall, Bessemers and all, will average about seventy-five cents a ton. Considerable of this advance was lost during the buying movement of this week, the reduction varying with the sales from thirty to fifty cents. This, it must not be forgotten, is true of non-Bessemers only, all the ores low in phos. holding well up to the price. There is unsold barely 10 per cent. of the Bessemer output for the year, and the producers are in no special hurry to part with their holdings, since they have eight months left in which to dispose of their stocks. The claim is made by some furnacemen in the Valley that they have coke contracts for August at from thirty to thirty-five cents off the regular price, and it is generally thought that coke prices will have to come down, as they are abnormally high in view of the general situation.

Pig Iron. Although the market is sluggish and dull, everybody is of the opinion that an advance is due about September 1, and that the people who are now keeping out of the market, will be compelled, sooner or later, to come in and buy, at prices considerably higher than those now prevailing. Bessemer can be bought at present in the Valley at $18.75, although as much as $19.30 has been paid during the week. The furnaces, as a rule, are fairly well supplied with orders, and there seems to be no dearth of orders for short or spot delivery, buyers being averse only to placing heavy orders for long future delivery. That the consumption of pig iron is fully in keeping with the production is evidenced by the fact that the gain in stocks has amounted to only about 7,000 tons for the past month, so that anxious people need have no fears on account of any overproduction of pig metal and, consequently, of weak prices to result from that contingency. The demand for smaller orders continues and, while a good many furnaces do not particularly care for this sort of orders, they continue to fill them.

SOUND ARGUMENTS ON THE TINPLATE DUTY.

The American Iron and Steel Association has shown good judgment in publishing for popular distribution the speeches of Congressmen McKinley and Burrows on the proposed increase in the duty on tinplate. The basis of Mr. McKinley's argument is comprehended in these explicit sentences: "We propose this advanced duty to protect our manufacturers and consumers against the British monopoly in the belief that it will defend our capital and labor in the production of tinplate until they establish an industry which the English will recognize has come to stay, and then competition will insure regular and reasonable prices to consumers. It may add a little temporarily to the cost of tinplate to the consumer, but will eventuate in steadier and more satisfactory prices." Mr. McKinley shows that we have four mills that can at once be adapted to making tinplate, their capacity being 4,000 tons a year. It will require ninety mills of the dimensions of those now here to make the tinplate used in this country.

Mr. Burrows, in giving a history of the decay and death of the tinplate industry in the United States, showed that every time American enterprise got on its feet in this manufacture, English manufacturers depressed prices until the American mills were forced to shut down. It was after the last shut-down of American mills, in 1879, that the foreign manufacturers determined to strike a final and death blow to this industry in the United States, and to that end agents of the American mills were followed by the representatives of the English mills, who announced to American customers that, no matter what the American product was offered for, they would sell 25 cents cheaper, and by this method they were enabled to utterly destroy the American manufacture and silence the last tinplate mill in the United States. Master of the situation the foreign manufacturer again advanced the price of tinplate to $7 a box. This disastrous result was accomplished under the operation of "a tariff for revenue only." It demonstrates how futile it is for the American manufacturer under an inadequate duty to contend against the merciless competition of a foreign rival.

Having thus their own way, the Welsh manufacturers secured in this country their most profitable market. In 1864 England sold us only 73,206,384 pounds of tinplate, for which we paid only $4,197,706, while in 1889 she sold us 742,136,640 pounds, for which we paid the princely sum of $21,726,707. To-day we consume more tinplate than all the rest of the world. In 1887 Great Britain exported 6,207,388 boxes, 4,526,367 of which were sold in the American market to the American people. In the last twenty-five years we have bought of England 7,835,501,792 pounds of tinplate, for which we have paid her, exclusive of duty and freight, the enormous sum of $320,037,362.

Mr. Burrows does not seek to evade the claim that the advance in duty would increase the cost to the consumer, temporarily, but he shows that, even at its worst, this increase would be but small, while compensation would be had in the establishment of an industry that would give employment to 35,000 workmen, whose annual earnings would be $23,000,000.

GEOMETRICAL PROGRESSION IN PREJUDICE.

We find this rather ungracious paragraph in the Chattanooga *Tradesman*, intended, doubtless, as an end to the recent discussion regarding the comparative showing of the Southern and Central Western States as pig iron producers:

> If the Cleveland *Iron Trade Review* could disabuse itself of the delusion that the *Tradesman* blindly worships percentages it might be able to see the real point we make in contrasting the growth of the South and the Central West in iron production. What we tried to get through the skull of our contemporary was this: The progress of the South as an iron maker is geometrical, that of the Central West arithmetical, as it were. Anyone who has mastered the higher arithmetical text-books knows how these progressions compare, and how much faster the geometrical is than the arithmetical. That was the whole of our argument. The *Review* has shifted its ground a couple of times to find a Northern iron district that would answer its purpose of comparison with the South in the matter of development, and seems to have finally settled down on the Central Western as its choice—the idea being borrowed from Mr. James M. Swank—and we hope it is now quite satisfied.

Certainly we are satisfied. Whether the Central Western furnaces be grouped according to geographical lines or (more properly) by districts, they show a comparison with the Southern States decidedly to the credit of the former, both in iron produced and in advancement made. The figures themselves tell the story—percentages, arithmetical progression, geometrical progression and political prejudices to the contrary notwithstanding. To be sure this advancement has not been preceded and accompanied by a great flourish of trumpets, but the solid fact remains, nevertheless. For instance, seven new furnaces, with a combined daily capacity of 1,259 tons, are going up in the Pittsburgh district at the present time, yet we have not observed that any dispatches have been sent over the country by Associated Press heralding the fact. The trouble with the *Tradesman* is that it is so absorbed in the work of self-glorification that it cannot pause to recognize that other sections are not only far in advance of its own but are steadily maintaining their prestige, and this without the aid of non-resident capital or boom newspapers. It should rub it eyes and look about a little.

A GREAT SCHEME IN CONNECTION WITH THE WORLD'S FAIR.

Those who have read the daily dispatches from Chicago, relative to the location of the World's Fair buildings, have no doubt been mystified as to the real issue at stake in the contest over the lake front. Just how much truth there is in the story it is hard to tell, but the statement is plainly made that it is nothing less than a vast scheme on the part of the City Council of Chicago to come into the exclusive possession and control of the proposed site, with a view to plunder on a most gigantic scale. Briefly stated, the situation is this: The present business district of Chicago is bounded as follows: On the south by Harrison street, on the west by the south branch of the Chicago river, on the north by the Chicago river, and on the east by Lake Michigan. The area embraced amounts to about 14,000,000 square feet. It is doubtful if any equal area in the world is covered with grander buildings, representing a greater outlay of capital. This real estate is worth from $6,000 to $15,000 a foot front. The land which the World's Fair directory proposes to reclaim from Lake Michigan has an area of 11,000,000 square feet. This land, assuming its value to be $3,000 per foot, would be worth $500,000,000. The purpose of the City Council in insisting that this land shall revert to the city after the close of the World's Fair is to create a new business district at the expense of the old, and to place the proceeds in the city treasury, less their own modest commissions, which might amount to a mere bagatelle of fifteen or twenty millions or more. Of course the owners of property in the present business district would be ruined, but what of that?

To be sure there is vigorous opposition to the scheme, and the threat is made that the whole fair will be abandoned unless the made ground is allowed to revert to the city for park purposes exclusively. Such is the story. The outcome will be awaited with interest.

TIN IN CALIFORNIA—A SIGNIFICANT FACT.

The old tin mines in San Bernardino County, California, which have not been wrought to any extent for twenty-five years, are to be re-opened, it is said, by an English syndicate, headed by Lieutenant-General Sir John Stokes. It is stated that the new company will have a capital of $2,525,000 and will issue debentures at 8 per cent. to the amount of $625,000. The price paid for the property is said to be $400,000, and the report is that the new owners will, if the McKinley bill passes, expend $250,000 upon a plant, besides establishing a mining town on a large scale. The ore is said to contain 10 per cent. of tin, and, if so, must be very rich, since the best ores of Cornwall run only 2 4-10 per cent. All which may be taken *cum grano salis*, but it is significant that Englishmen themselves should thus recognize the necessity of protection before a tinplate industry can be built up in this country.

THE growth of American cities is not the least remarkable feature shown by the forthcoming census. At the first census, just a hundred years ago, there were but six cities having 8,000 or more population, their total being 131,472, or 3.3 per cent. of the whole population of the country. At the end of the first fifty years, there were forty-four cities of 8,000 or more, with an aggregate population of 1,453,994, or 8.9 per cent. of the whole population. In 1880 there were 286 such cities, with an aggregate population of 11,318,547, or 22.5 per cent. of the whole. Now, at the end of a hundred years, there are undoubtedly more than 300 such cities, with an aggregate population of about 17,000,000, or about 27 per cent of the whole. While there has been a drift of manufactories outward from the larger cities in some directions, they still remain the great hives of industay and will no doubt continue so to be.

IT is to be hoped that after the disastrous experiences of the past week, Congress will no longer hesitate to make a sufficient appropriation to improve the Sault Ste. Marie Canal and Hay Lake Channel. Longer delay in this matter will be little short of criminal neglect.

THE new railroad from Jaffa to Jerusalem will be built with Turkish money, by French contractors, and the Belgian-built cars

will be propelled by American locomotives. Three "moguls" were shipped from Philadelphia last week for this purpose. Now if the superintendent of the road were an Englishman, the "guards" Germans, and the train-boy a New York gamin, the cosmopolitan features of the road would be complete.

THE manufacturing census of Cleveland will soon be taken, and our manufacturers can do no better service to their city than by replying promptly and fully to the inquiries of the enumerators. Cleveland is a great manufacturing center and should be so made to appear in the decennial figures.

THE financial world presents no striking feature at the present writing. There is an absence of speculation; the bank reserves show a steady increase, and there are no fears of a stringent market in the near future. Altogether the financial situation is reassuring.

WE welcome the *Virginia Manufacturer*, of Buchanan, Va. The fact that Mr. Joseph D. Weeks is responsible for the general make-up is a sufficient guaranty that it will ably represent the industrial interests of Virginia.

THE large buyers of Lake Superior charcoal iron are about to enter the market, and a lively movement will no doubt be witnessed within the next week or ten days.

A YEAR'S RAILROAD WORK.

Poor's "Manual of the Railroads of the United States for 1890" has just been issued, and is before us. It states that the general results of the operations of the country during the past year were more encouraging than in 1888, showing healthy increase in gross earnings, with a small reduction in the average ratio of expenses to earnings. The gross earnings of all railroads in the United States during 1889 were $1,003,736,596, an increase, as compared with the previous year, of $430,480,326. The net earnings were $322,284,986, an increase as compared with 1888 of $20,653,935. The miles of road worked during 1889 were 152,745, an increase over 1889 of 71,358 miles.

The total amount of gross earnings reported by the steam surface railroads in operation in the United States in 1889, equaled $992,856,856. Adding to this the gross earnings of the elevated roads in the cities of New York and Brooklyn, $10,879,970, the grand total reaches the sum of $1,003,736,596—a sum 50 per cent. greater than the public revenue of the United States, and nearly equal to the United States public debt.

The most marked increases in earnings were in the States west of the Mississippi and east of the Rocky Mountains. In the Middle States the losses in gross earnings suffered by the coal-carrying roads kept the increase for the section down to a narrow margin of $4,500,000, while the South fails to show any gain of consequence. In the latter case, this failure to show expected results is due wholly to the inability of the vast number of new roads which have been brought into operation to report for a full year, as the date of their several openings in nearly every case antedated the close of their fiscal year only by a few months. In consequence, the figures of actual traffic statistics cover only the part of the year during which the several roads were operated in 1889.

The total number of miles of railroad in the United States at the close of 1889 was 161,397.

The share capital corresponding to the mileage completed at the end of 1889, equaled $4 495,099,318, against $4,488,411,342 in 1888, the increase equaling $56,687,976, the rate of increase being 1.26 per cent.

The funded debts of all the lines at the close of the year aggregated $4,828,365,711, a sum of $204,330,748 in excess of the total of 1888 ($4,624,035,023) an increase of 4.4 per cent.

Foreign Capital and Lake Shipbuilding Plants.

Congressman F. W. Wheeler will soon return from England, but there is nobody who believes he has sold his West Bay City shipbuilding plant. Neither is it probable that any of the lake shipbuilding concerns could be floated on the English market, though they have all made a great deal of money within the past three years. The shipbuilding companies are, of course, not anxious to sell, but since the rumors about Cougressman Wheeler's movements have gone out, the impression that the Englishmen who are investing money in America are doing so injudiciously, and that they have been badly taken in in some of their purchases. This is not true, as a number of cases at hand go to show that many of their investments have been very profitable. Take for instance, the purchase of the plant of the Otis Iron & Steel Co., of Cleveland, one of the heaviest investments in manufactories as yet made by the foreigners. The purchase price, or the capital of the new company, was $4,500,000, and it was thought to be very much more than the plant was worth. With the first year's work, however, the new company paid a 12 per cent. dividend on the common stock. They demand in all purchases a showing of earnings for a period of years and in this many shipyards, as well as freight carrying lines on the lakes, would be barred out.—[Marine Review.

SHEFFIELD, Eng., furnishes all the steel required for the steel pen works at Calais, which are of considerable magnitude. These pens are exported more or less to all parts of the world, but principally to Belgium, Russia, the Levant, Spain, Portugal and South America, either direct or through Paris houses.

THE SUPPLY OF OLD RAILS.

It is extraordinary how slowly the iron rails in the tracks of our roads are coming up. It is a remark very frequently made in trade circles that the supply is rapidly approaching exhaustion, and manufacturers, depending upon old iron rails as a raw material, are known in some cases to be contemplating the erection of steel plants. It is true that in considering this step they are not only taking account of the supply of raw material, but also of the growing competition of manufacturers of soft steel in certain specialties. The heaviest consumers of old rails are the manufacturers of track materials, of spikes, angle bars and bolts. In angle bars that competition has been severely felt during the past few months, notably in the East. Steel makers have learned to use the use the right kind of stock, so that the question of quality is settled. This movement is likely to offset, to some extent, at least, the steadily growing demand for track material, with its accompanying increase in the demand for old stock. But the supply of the latter is not by any means likely to fail as quickly as many are inclined to believe.

The following table from the summary of Poor's "Manual," just issued, throws much light on this subject. It gives the number of miles of steel rails and iron rails in the United States, and the percentage of steel of the total for a series of years:

STEEL AND IRON RAILS IN THE UNITED STATES.

Year.	Miles Steel Rails.	Miles Iron Rails.	Total Miles.	Per Cent. Steel of Total.
1880	33,680	81,967	115,647	29.1
1881	49,063	81,473	130 536	37.5
1882	66,691	74,269	140,960	47 3
1883	78,491	70,692	149,183	52.7
1884	90,243	66,254	156,497	57.6
1885	98,102	62,495	160,597	61.0
1886	105,724	62,324	168,048	62.9
1887	125,459	59,588	185 047	67.7
1888	138,516	52,981	191,497	72.3
1889	151,723	51,054	202,787	74.8

At the close of the year 1889 not less than one-fourth of the trackage in the United States was laid with iron rails. By far the greater part of it, of it, of course, is in sidings. According to Poor's estimates the 160,544 miles of railroad of the country had besides 42,242 miles of sidings, second track, etc. Poor distributes the mileage as follows:

IRON AND STEEL TRACK—MILES.

Groups.	Iron.		Steel.	
	1889	1888.	1889.	1888.
New England	2,799	3.089	7,570	7,222
Middle Group	7,312	7,804	25,518	23,978
Central Northern	14,193	17,391	46,186	43,311
South Atlantic	4,372	4,721	13,637	11,504
Gulf and Mississippi	2,823	2,752	9,890	9,769
Southwestern	10,041	12,306	25 661	21 567
Northwestern	6,250	5,529	16,536	15,215
Pacific	3,278	4,058	6,724	5,950
Totals	51,065	52,981	151,723	138,516

The Northwestern group, which includes Iowa, Minnesota, Nebraska, the Dakotas, Wyoming and Montana, actually shows an increase in the iron track. The others all exhibit the falling off to be expected.

These figures pretty thoroughly establish the fact that there is still an enormous reserve of old iron in the tracks. In the past it has come out in a fitful manner, thousands of miles being taken up in one year against hundreds at only a few years later. If, as is likely, the greater part of the iron rails are in sidings, it cannot be expected that they will appear in the market with a a rush. Their service is unimportant and does not readily attract the attention of the operating department. In limited quantities old iron rails will be offered for sale for a good many years to come.—[Iron Age.

Machine Oils.

Says a correspondent of the *American Machinist*: "I inquired once from a well-known manufacturer of lubricating oils, who went scientifically into the business--would we could say the same of all oil fiends—whether it was not a fact that the thick oils themselves needed to be lubricated, and he replied that it was so, and that he himself believed, that by a proper admixture of a thick oil and a thin one, there was obtained a lubricant of a compound nature, containing particles of heavy oil, which carried the heavy pressure of the bearings, and between these heavy particles the lighter oil formed an inner lubricant, assisting the heavy oil to roll freely against its own fellow-molecules. The idea, coarsely, is simply that of ball bearings. A ball bearing on, say, a bicycle, is a powerful reducer of friction, but no bicycle rider would run even ball bearings without oil, for this lubricates the individual spheres where in contact, as they often are, and so with a mixed oil the heavy particles may be taken to represent the balls, and the lighter ones the oil between them."

Soft Steel Plant.

An addition to the Homestead Steel Works of Carnegie, Phipps & Co. is being made, which, when completed, will make these works perhaps the most complete of any in the world. The new department consists of a plant for the manufacture of soft welding steel, of which heretofore there has been comparatively little made in this country. The building is now erected and the machinery being put in place. Eight basic furnaces will be put in, and, at the rear of them a tramway on which steam traveling cranes will be run, will be built, the cranes carrying the bins containing the charges for the furnaces. By suitable mechanism the furnaces will be charged without the intervention of hand labor, and so avoiding all litter in the way of either men or machinery. Four hydraulic cranes of 17,000 pounds capacity, and one of 35,000 pounds capacity, will be put in. The machinery will be operated by a 56″x42″ Corliss engine.—[American Manufacturer.

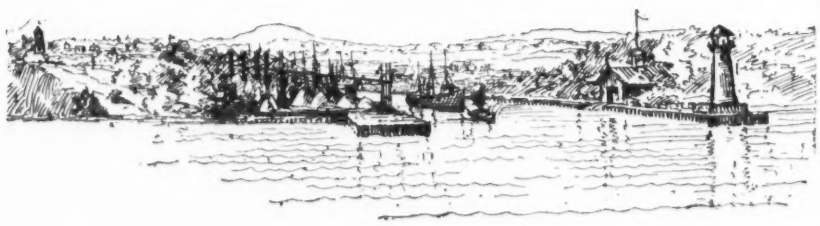
LAKE ERIE PORTS: THEIR COAL & IRON ORE HANDLING FACILITIES

IV.—FAIRPORT.

Fairport, as a village, was platted seventy-eight years ago. The location chosen was at the mouth of the Grand River, on its eastern bank, by Samuel Huntington, Abraham Skinner, Seymour and Calvin Austin and Simon Perkins. These early pioneers chose a site for settlement that was naturally adapted to the needs of a growing community. The foresight of the founders of Fairport was not matured alone by anticipations of a future dwelling place contiguous to a navigable body of water, as Lake Erie, but also the inspiration accompanying all these early glances, westward from their New England homes, from the time of leaving, the usual journey by water and the looking forward to a successful landing; would very naturally culminate when a *fairport* was reached, thus, no doubt, the early associations connected with a propitious first treading of the Western soil was in no small way the foundation for the christening of the new settlement, Fairport.

The first warehouse was erected in 1803, two miles up the river, by Abraham Skinner; then the small sailing craft, having little depth of hold, could easily reach its docks, but in the recent growth in size of vessels, in contradistinction to Charles Dickens' denomination of a Connecticut river boat, on his visit to America, in which, when describing its dimensions, said that in *shortness* it was a certain length, and in *narrowness* another amount, he might have referred to its depth as *shallowness*. The term is expressive of the difference between the size of the early lake boats and the ones in use at present, at least the referring to the depth of hold, in this manner, when speaking of the early lake crafts; would amply designate how warehouses and docks were reached a few miles inland when now the large carriers sometimes even find trouble in entering well-kept harbors that have a certain amount of dredging done yearly, and have had their water deepened along the whole dockage fronts in recent years to accommodate the rapidly growing lake marine in its *width*, *length* and *depth*.

In the '40's there were eight forwarding houses, as the warehouses were named in those days, when all the inland country for miles around was tributary to a port of entry, and depended upon it in its shipments of produce, such as the cereals, etc., and the exchange therefor of mercantile commodities. These activities naturally needed accommodations at the point of ship-



GENERAL VIEW OF FAIRPORT HARBOR.

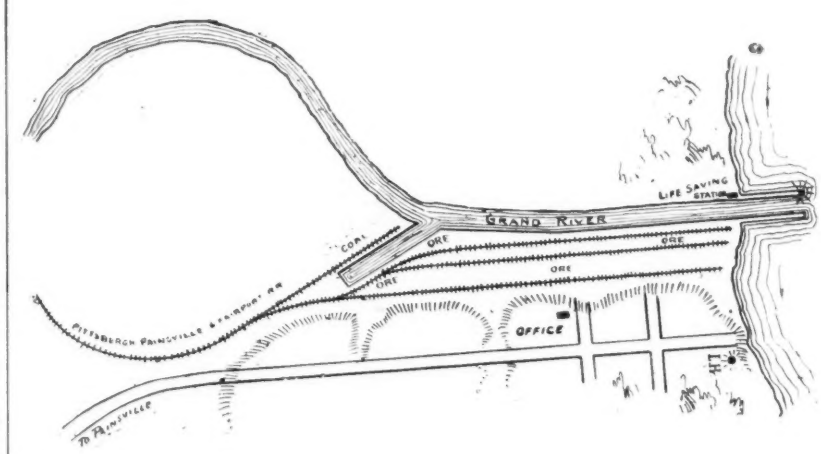
ment, hence the large number of forwarding houses to store the products for trade. Of course when the railroads ran inland, and, as such opened up new arteries of communication between, heretofore, inaccessible points, and afforded a ready means for the transportation of the country's produce, the lake traffic gradually decreased, until a new industrial awakening laid claim to the inactive waters and the unoccupied wharves that had lost their former activity, and thus paid tribute to its distancing rival, for the time being—the railroad.

The new industrial order, however, brought about a joint activity between the former rivals for the hand of a growing commerce; and in this co-interest has developed remarkable results.

The dawn of this new era, for Fairport, began at about the time of the completion of the old Painesville & Youngstown (narrow gauge) Railroad, but the activity in lake and rail shipments did not reach any large amount until 1886, when the docks began to be operated by the present operators, in August of that year. From that time to the close of navigation 47,000 tons of ore were received.

The Painesville & Youngstown Railroad was changed to a standard gauge road on August 9, 1886, and the receipts for the same year, previous to this change, were some 65,000 tons. The following year they had reached a total of 501,368 gross tons, while in 1888 the amount was represented by 611,140 tons and in 1889 the total reached the handsome figure of 830,000 tons. In handling this traffic they use 17 Brown hoists and 36 McMyler rotary derricks, with which they can handle 2,500 tons of coal and 12,000 tons of ore per day, and with these handling facilities ten ore and three coal vessels can be accommodated at one time. The hoists are sufficient to supply 53 hatches.

The dockage front reaches 6,600 feet, of which 1,050 are devoted to the coal traffic, and the balance to the ore trade; 3,300 feet of their total frontage is 200 feet wide, and the remaining half is 340 feet in width. Thus, with about 174,666 square yards of ore dockage, they have storage room for 1,000,000 tons of iron ore exclusive of the necessary room for tracks, etc., which is, of course, included in the above aggregate area devoted to the ore business. The new docks constructed and included in the total frontage as already given are, viz.:



MAP OF FAIRPORT HARBOR.

1,350 feet devoted to ore handling and 1,050 feet to the coal business, with a slip of 1,050 feet long by 150 feet wide, contiguous to the new docks recently built.

The ore docks are owned by the Consumers Forwarding & Storage Co, of Pittsburgh, of which Mr. Henry W. Oliver, Jr., is President, and J. R Irwin manager of the business at Fairport, also the Pennsylvania & Lake Erie Dock Co.; while the coal interests are controlled by the Pittsburgh, Fairport & Northwestern Co. The ore traffic is trans-shipped by the Pittsburgh & Western Railroad Co. over their leased line, the Pittsburgh, Painesville & Fairport Railroad, formerly the old Painesville & Youngstown road, originally built as a narrow gauge, and upon its being widened the name was changed to the Pittsburgh, Painesville & Fairport.

Fairport enjoys a special favor, in that the consumers of the iron ore operate the docks themselves, hence there is not the accumulation, en route, of ore upon the docks, waiting for transportation, as where the circumstances are changed. The vessel shipments are sooner placed at the furnaces because of this fact. The depth of water adjoining these docks is, at its lowest, all of 17 feet, thus affording ample depth for the moorage of the largest carriers.

The original docks as operated by the Painesville & Youngstown Railroad Co. were but 300 feet long. The coal handlings for 1889 were 150,000 tons, and for May and June 1890 the traffic for the respective months reached 2,000 tons in May and 5,600 tons in June, or a total of 7,600, showing an increase of 3,600 tons in June shipments over May. The ore receipts for 1890 have been: May, 155,510 tons, and during June they reached 175,348 tons, showing a total of 330,858 tons, and an increase of June receipts over those of May of 19,838 tons. The increase of June shipments over the preceding month at Ashtabula were 16,039 tons, showing an increase for Fairport, over her active neighbor, of 3,799 tons; which, no doubt, is accounted for by the fact of the operations of the docks being in the hands of the consumers themselves. We wish to express our appreciation of the kindness of Mr. J. R. Irwin, manager of the several interests located at Fairport, for furnishing us the necessary data for this article.

The approach to these docks is maintained by two piers extending into the lake, upon the western one is placed the light house as well as the life-saving station. They are of the crib type, and, no doubt, should be extended out into deeper water, so as to obviate the necessity of frequent dredging; and in view of the rapidly growing commerce the goverment appropriations

should be liberal, accordingly. The view is a pleasant one on entering this port, with the hills hemming in the river on its eastward side, and thereon standing the inland mariners' guide, while in the distance are the the hills of the surrounding country, and directly to the south, ten miles distant, upon the horizon, rises Little Mountain, appropriately adding its picturesque outline to the scenes of the foreground.

The Stove Trade Outlook.

A few weeks since these columns contained some observations urging upon dealers the advantages of ordering stoves in advance of the activities of the Fall season. It would appear that in this we anticipated the desire of a majority of the more enterprising dealers of the West and Southwest, for with large unanimity the stove manufacturers report the receipt of orders earlier and with more regularity than for several seasons past.

An excellent start for the season has thus been made in the stove trade, and it is not likely that the annoyances attending shipments early in September, when manufacturers are at their busiest, will be so pronounced this year as during former seasons. There is also uniform expression of satisfaction among dealers over the new patterns and improvements that the stove foundries are turning out this year, and a cheerful feeling pervades the trade at large, to which it has been a stranger for at least two seasons. A belief generally prevails, and is at least supported by historical precedent, that a repetition of the last two open winters is most unlikely. Three seasons of such character have rarely, if ever, followed in close succession; and it is remembered with some gratification that former summers characterized by intense heat were invariably followed by seasonably cold winters. There is some comfort for the stove trade in this latter reflection.

With the enterprise characteristic of the trade, the stove manufacturers have made extraordinary preparations for the Fall and Winter trade, and should their hopes of seasonable weather be realized, they will be able to meet the largest consumptive demand in the history of the trade, and with a better and more varied assortment of goods than were ever before offered. The dull months of trade, just passing, have afforded ample opportunity for the busy employment of mechanical genius in devising improvements in construction and finish of stoves and ranges, with the result that the output of the present season is believed to be as near perfection as human ingenuity and skill can approximate.—[Stoves and Hardware Reporter, St. Louis.

Necessity and Cost of Renewing Machinery.

One of the largest items of expenditure in manufacturing is caused by the constant and rapid evolution of machinery of superior quality to that in use. Thousands of tons of machinery is in this way rendered useless every few years. Practically the whole of the blast furnace enginery employed ten years ago has gone into the scrap pile since 1885. Scores of engines hardly more than worn smooth in their working parts, have either been cast aside or their comparative inefficiency has entailed loss on those who retained them. And this is equally true of saw mill, flouring mill, cotton mill, woolen mill, carpentry, cabinet and all other machines, including agricultural tools and appliances of every kind. The manufacturer who keeps well up with the highest requirements of his trade must renew his machines and tools on the average every five years, no matter whether those in use are half exhausted or as good as new.

There is one consolation for industrialists in this, and that is the constant cheapening of machinery as it improves in efficiency. This is particularly true of agricultural tools and machines. A fine self-raking and self-binding harvester can now be bought for half the cost of one of the lumbering, horse-killing concerns in use twenty or thirty years ago, and so of nearly the whole list. And where the new plant in a factory costs more than the old and superseded, the greater rapidity and excellence of the newer more than compensates for the outlay. Yet the fact remains that amateur and shallow observers of and writers on manufacturers' profits seldom think of or mention the fact that the manufacturer must devote a large fraction of his income to the purchase of new plant long before his old is worn out, simply because it has been superseded, and he must have the best or fail.—[Chattanooga Tradesman.

He Bought a Typewriter.

GREATT BARRINGTON, feb 6 1890

De@r F.iend—I have ?Ough!? a tripe waiter (No d—$ It a T. Y. P. E. W. R. T. E. R.) Am nOw Dev@ting @ little lei$ure time to GEtting acuuainted with It the Agent s@id itt, cood (could) be learned inno time :n Abel—bodied m@n 02 wrxte 100 lefters A dAy—i @m no! able bodied ju$t now owing 2 An axident I hod While squatinG-' 1 Wrote 8$4 letters in one day & they aLl loaked wurse than this. he Said is would be a thxng of beavty & jOy FORever;) i wish he w*tld come back. I want See him very BAD. I have had this type writer only 2 Days & used up Al ready 27 reams of paper also got the infernal thing Soit wont wRite anything bZt Xolopuck or Russian, he told me It W!s cus to Mary 2 n@ve pa tience, thats All right; after 1 get through w4th Him dR smaLl will have one More, i paid $17 74 for type writera—and have conclzded trade IT off for A dOg then .f(| can borrow a Gun J'llkill him. Good bZe more tatter. exquses my !*SS--I--$. -[Berkshire News.

Sale will be Confirmed.

A Youngstown special to the Pittsburgh *Dispatch* says: Information has been received from a credible source that the creditors of Brown, Bonnell & Co. will receive the face of their claims in full, and will lose the accrued interest, though the assets may be sufficient to pay a portion of that. When the concern failed seven years ago, the claims against it amounted to $1,400,000. It is probable the recent sale of the plant will be confirmed, and soon after that the receiver will make a distribution of the assets to creditors. It is understood the plant will continue in operation.

MACHINE DESIGN FOR STEEL WORKS.

One thing which caught my attention when I first began on machinery for steel works' use was the tremendous factors of safety and the enormous quantities of iron that were put into all the castings. It seemed to me that the country would be ruined if things went on that way long. But on going out into the works and seeing the machinery handled, especially the cranes, I wondered that iron could be cast thick enough to stand the pressure. The need of much common labor is an evil which a few of the best companies only are taking any extensive steps to root out. But in those companies labor-saving machinery is being devised for every purpose to head off the ravages of the "Polock" and Bohemian. But Rome was not built in a day, and at present we must raise our factor of safety high enough to withstand said ravages.

In roof and bridge work a factor of four or five is considered quite sufficient for any contingency that may arise. The chances of cases in which dangerous strains are set up in these structures are pretty well known, and to cheapen them some risk is taken—sometimes too much.

There is a Scylla and a Charybdis in the designing of every machine or structure. One of these is excessive cost, and the other excessive risk of breaking down. For different purposes these evils change their magnitudes to suit circumstances. There is a different end to attain in each case. A rolling mill and a bicycle should not be designed similarly with the same strains per square inch and the same care in finish. It is very important that a mill should always be ready to run; that it should be simple, and all its parts made of such size that the roughest usage will not prove injurious. A break down on a plate mill at a time when work is crowded, and there are many orders to fill, means sometimes the loss of two or three days. The heavy machinery cannot be handled quickly, even if spares are at hand ready to be put in place. The loss of the time, therefore, is of much more consequence than the loss of broken rolls or housings, and the reason why strains of only 4,000 or 5,000 lbs. per square inch on wrought iron or steel in tension, and 800 or 1,000 lbs. or less on castings, are used in practice, are becoming evident when the circumstances are considered. It is much cheaper, in other words, to put in the extra iron—costing but a few cents a pound at most—than to save it scrupulously and lose thousands of dollars lying idle repairing machinery. As one of the great steel men in the country has said: "If you put in a few pounds too much metal you never know it, but if you don't get in enough you had better throw the whole thing away to begin with."

There is no way of calculating sizes in many places, and, for that matter, no necessity where experience has shown proper proportions. How can the strain on the housings of a mill be figured when a large slab gets stuck half way through the rolls and stalls engine and fly-wheel in one revolution? It is hundreds of tons, probably, but we can only roughly approximate it. So, too, when one of the "pit gang" strips a hot ingot, and lifts it out to the surface, and then tips it over with the tongs still attached and lets it come down full force on the end of the jib of the crane, which is made so as not to notice that anything has struck it.

Cranes must be made so as to allow all sorts of accidents and carelessness. They must not be injured; for instance, if some sleepy Italian lowers the jib down into a pile of ingots. You can't make him careful, so you must do the other thing—make the crane as accommodating as possible.—[The Technic.

Tempering Small Screws.

It is tiresome work to harden 200 or 300 screws, springs and other minute bits of steel, says the *Northwestern Mechanic*. It is almost impossible to heat them into the same degree. The best way to do such a job is to procure a short piece of steam pipe, weld up one end and put in pieces to be hardened and heat pipe and its contents to the required degree. The heat must be slow, as the pipe can be almost melted before its contents become fairly red. With a good fire and care taken not to force the blast, the pipe and its contents can be raised to the required degree of heat. When hardening, do not throw the pipe into water and drop contents into liquid that is used, be it oil, brine or pure water. If the pipe be thrown in, the hardening is not done as quickly as if the water came directly in contact with the pieces of steel. Tempering such things should be done in a sand bath. The sand can be heated to just the degree desired, and the temper drawn without running the risk of being too hot. A lead has been found excellent for large work, but for minute objects, heating in a piece of steam pipe is about the best method yet devised.

Iron-making in Ita'y.

The iron industries in North Italy are extending, according to the latest report of the British consul at Genoa (Mr. Yeats Brown). Galvanized roofing iron is now made at Sestri, iron and steel wire at Turin, delta metal, on Mr. Dick's patent, at Cornigliana, and at Milan an extensive plant for making steel castings is being put down. Thin steel plates are being made at Sestri and Rivarolo, boiler and ship plates at Genoa and elsewhere. Germany appears to be supplying a good deal of heavy work, steel castings, shafting, flanged plates, etc., to the Italian foundries and mills, and it is reported that the quality of the German productions have much improved of late. English goods are, however, considered the most reliable, though higher priced, but steel boiler plates can be obtained from Glasgow as cheap as from anywhere. An effort is to be made, according to rumor, to establish tin-plate works in Italy, as the duty is very high.

Attention G. A. R.

The Nickel Plate will run a special train to Boston, on Sunday, August 10th, to enable the Boys in Blue to attend the annual meeting and national encampment of the Grand Army of the Republic. Wait for this train. For time and rates consult Nickel Plate agents, 224 Bank St., 598 Peal St. and depots.

DIAMOND SAFETY STEAM ENGINES AND TUBULAR BOILERS.

The design and construction of the engine herewith illustrated (Fig. 1) are with a view of simplicity, durability and strength. To insure a perfect engine, the manufacturers submit each engine to a steam-test, and try it under all conditions before it leaves the shop. These engines are noiseless in running, and require scarcely any attention whatever. The workmanship is of a high grade and accurate. The slides, journal boxes and lower cylinder head are cast with the bed, and the center of cylinder, cross-head and crank-shaft are in exact line with the front of bed. The advantages of this form of engine can readily be seen. The piston-rod packing is easily got at, also the main journals, slides and cross-head. There is only one joint in the steam chest. The fly-wheel is perfectly balanced, and turned to be used as a pulley if so desired. The crank-shaft, pitman and valve gear are of the best wrought iron forgings. The pitman boxes are simple in construction and made of the best gun metal, and easily adjusted for wear. The piston head has self adjusting metal rings. The valve stem is guided in square babbit-metal boxes, which allow no side thrust. The valve is designed to regulate the steam in the most economical manner and obtain the greatest power for the least fuel.

Figs. 2 and 3 represent a Diamond safety upright tubular boiler, made from C. H. iron, of a tensile strength of 50,000 pounds to the square inch, and heads, fire-box and cones of 60,000 pound T. S. steel, and lap-welded flues. The construction of these boilers is such as to keep the entire length of flues

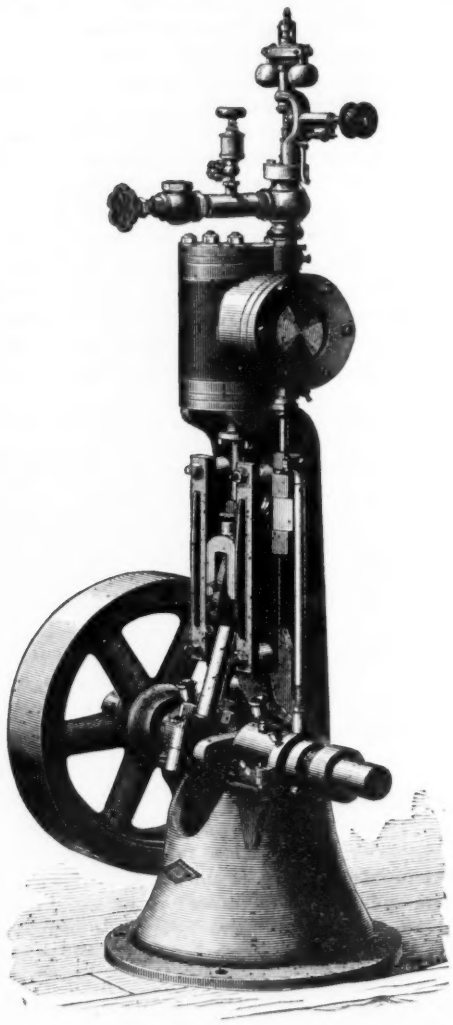


FIG. 1.

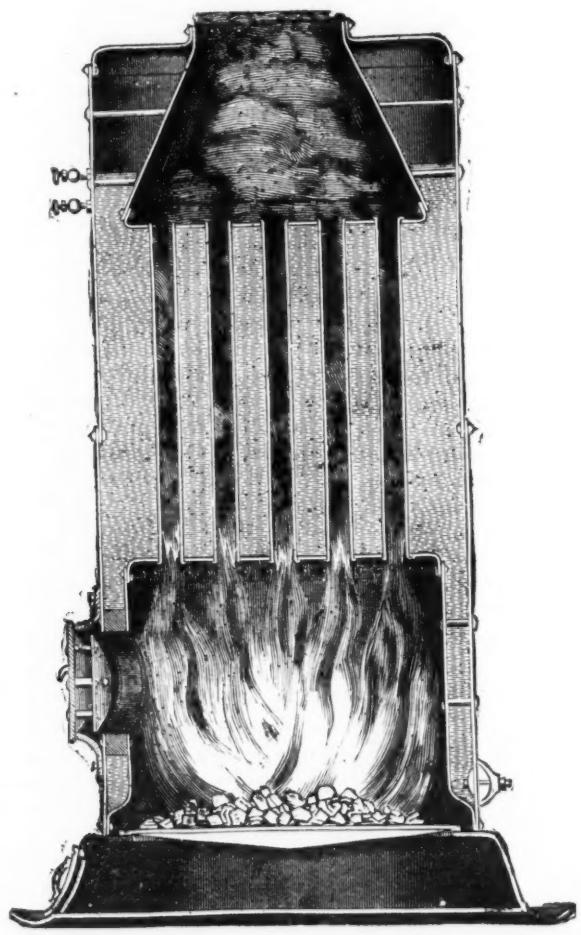


FIG. 2.—DIAMOND SAFETY STEAM ENGINES AND TUBULAR BOILERS.

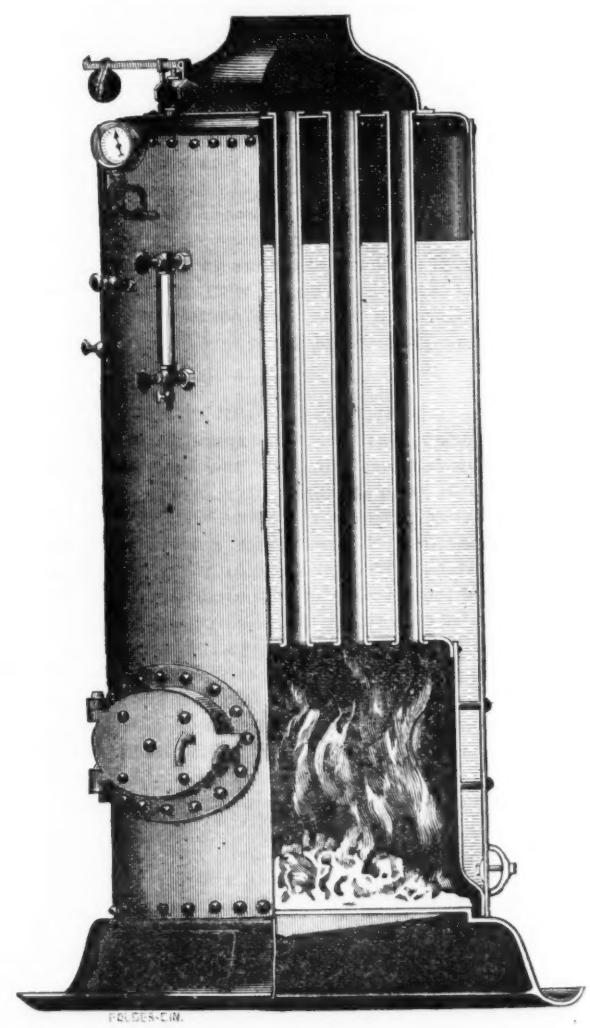


FIG. 3.

covered with water. Large numbers of them have been sold. Manufactured by Crawley & Johnston, Cincinnati, O.

The Eastern Iron Scale.

The fight now in progress between the Amalgamated Association of Iron and Steel Workers and iron and steel manufacturers of Eastern Pennsylvania, over the scale of wages adopted for the first time at the recent Pittsburgh Convention, is of vital interest to every worker in these industries east of the Allegheny Mountains. Already there have been conflicts between employer and employed at Bristol, at the Trenton works of Cooper, Hewitt & Co., and at the Catasauqua Manufacturing Co.'s works at Allentown. Trouble is foreseen at Reading and other points where the workmen have not as yet decided to force their demands. Several of the Philadelphia mills have already signed.

In the case of some establishments the scale is refused because it is considered too high, while in many other cases it is the old fight against organized labor. The wages throughout are based on a 2-cent a pound selling rate of iron. Should the price fall below this there is no decline in wages, while if it rises, wages rise. The association considered it necessary to establish a minimum. The scale for Eastern Pennsylvania and neighboring parts is lower than for Pittsburgh and the West, because the latter has advantages in cheaper fuel as well as in other ways. In the case of puddlers, for instance, there is a difference of $1.50.

The sixty-four mills in the East and in Philadelphia, which have a special wage scale, last year put out a total of about 1,000,000 tons, not including the nails. Though it is impossible to get at accurate figures, experienced iron men put the number of men employed in the East at 10,000, probably a third of whom belong to the Association. The entire 10,000, however, have interests at stake.—[Philadelphia Record.

The Transfer of Industries.

The transfer of industries is one of the most strongly marked and distinctive features in modern industrial life. Its economic causes are to be found in the exhaustion of local supplies, the development of new areas, and the changing centers of commercial distribution. The industrial decline of New England is in obedience to the laws named. Its iron and steel manufactories are largely things of the past. A few years ago, three-fourths of the steam boilers made in the country were made in New England. Machine shop, planing mill machinery and steam engines were among its most prominent and thriving industries. Now they are bought in Pennsylvania and Ohio.

The oldest iron manufacturing works in Massachusetts is being transferred to Kentucky. It was founded by Cyrus Elder, who was an expert in the making of gun metal, and in the South Boston Iron Works produced the best of naval, siege and field guns. Some 200 men are employed at these works, and the removal of the plant is not a consequence of trade stagnation, but the necessity of getting nearer to the base of its supplies of coal and ore. Proximity to the source of supply is in many cases the only escape from the intense and ruthless competition of modern times, and what is true of the iron industries, is applicable to all other branches of manufacture.

The departation of manufactures from the Eastern States to the West and South, will largely change the old centers of wealth and industry. These displacements may entail some local misfortune, and break up some time-honored establishments, but in a general and national sense, the distribution of industries is an economic necessity, and an industrial blessing.—[Age of Steel.

Discovery of Novel Properties in Cast Iron.

Some specimens of cast iron, which exhibit unusual properties, produced at one of the great stove manufactories in Albany, N. Y., have excited much interest, the pieces of metal being about 1 inch in width, ⅛ inch in thickness, and some 15 or 18 inches in length. Of these strips some were twisted so as to form spirals, and others were wrapped upon coils. That cast iron can be made very tough, and even a certain amount of elasticity be imparted to it is, of course, well known, but it is unusual, if not unprecedented, for any metal employed in stove foundries to bear such tests as those thus indicated. The twisting and bending in this case were done hot, there being nothing in the specimens but a judicious mixture of good irons and the absence of old scrap —the fact being also stated that the irons in question represent the daily meltings of the foundry from which they came, all the stoves produced there having their plates of the same metal which exhibits this peculiar toughness. It is not asserted that, because the metal will bear a torsional strain of the kind described, it is, therefore, unbreakable, there being, of course, a limit to its remarkable elasticity.

THERE are 360,000 miles of railroad in the world or enough to reach around the world fourteen and one half times. There are 104,000 locomotives.

THE HUMOR OF INVENTION.

The history of patents has its humorous, as well as its pathetic side, a humor not the less real in those instances where the inventor has been unconscious of it. Many of the combination tools come fairly within this class of inventions, some erratic geniuses appearing to have a mania for contriving the most impracticable assembly of utensils in one implement, examples of which have appeared from time to time in these columns. Another example was the "plug" hat, fitted up as a sort of portmanteau, with an apartment for cuffs and collars, others for brushes, for socks, for handkerchiefs, etc., the wearer carrying thus on his head all the absolute requisites for a brief journey from home. The inventor probably never stopped to consider that by the time the traveler accomplished his first stage he would lose no time in transferring the weight to a hand-bag as soon as one could be bought. A combined cap, pillow and life-preserver is closely allied to this school of inventions. It is intended for use on ship-board, makes a serviceable cap for deck wear, blown up partially serves for a pillow, and when fully inflated with air it does duty as a life-preserver in case the ship comes to grief. The humor is of a rather grim sort which is suggested by the invention of an American gentleman, who is reported to have patented a combined inkstand, pistol case and burglar alarm, said to be particularly valuable in the editorial rooms of Western newspaper offices. Its practical application under trying circumstances is thus described: An editor sits at his desk writing. One of the Hatfields or one of the McCoys enters to ask a correction of the report about that row over on Hell-for-Sartin Creek. The editor reaches forward as if to dip his pen in the ink. He touches a spring in the top of the inkstand. A shallow drawer flies open toward him, and his hand drops upon the revolver. At the same time the alarm goes off like one of those new devices to call people at 5 A. M. in country hotels. The mountaineer jumps back as if he heard the b-r-r-r of a rattler, and before he recovers he is covered.

For an extremely practical article the umbrella has furnished no small part of the aggregate amount of merriment, some of which is due to its proverbially unstable ownership. But no joke ever uttered or penned on the erratic movement of umbrellas equals that of the Patent Adustable Non-stealable Burglar-proof Attachment to prevent this tendency to change proprietors. It can be readily attached, so the inventor says, to any umbrella or walking-stick. Inside the ball or handle is a small, clear-toned gong, the size of a chestnut bell, which can be heard at a distance of one hundred feet. The umbrella stock is hollow, and is fitted with a slender steel rod running its full length, connected with the gong machinery at the top and ending at the bottom flush with a ferrule. The operating machinery is composed mostly of springs, and is wound up with a key which is carried in the vest pocket. A series of seventy-two combinations can be used in setting the alarm, the numbers being stamped on a silver band encircling the handle below the ball. The owner sets the alarm to any combination he desires, and deposits his umbrella fearlessly in any public place. If any one who does not know how to release the combination picks up that umbrella, the steel rod drops down through the hollow stick, and the business inside goes off at once. The thief realizes that he has no immediate use for that umbrella, and goes off too.

Scarcely less delightful is the plan of another genius for preventing water dripping from the ends of the ribs upon the clothing of the bearer by a series of pendant cups, connected by a rubber tube to catch the water and direct it all into a single stream from one cup, furnished with an outlet. "Spouting" an umbrella is no new expedient, but it has never been accomplished in just this fashion before.

The simple innocence of the domestic hen seems to have attracted the attention of inventors in no small degree. Nature is supposed not to have done enough for her, or to have done too much, and to have left scope for improvements. There is, for example, the "hen surpriser," a mechanical nest that drops the new-laid egg through the bottom into a hidden receptacle, the wicked design being to beguile the disappointed fowl into promptly laying another. And there are the "chicken hopples," rearward projecting prongs fastened to the legs, which not only render scratching of the earth a hopeless undertaking, but keep the hen walking with at least the imitation of the untiring energy of the professional pedestrian. A "hawk-wheeze" is the invention of a genius in British Columbia. It is a mock hen built to imitate closely the real article—clucks, scratches, looks out of one eye, and does all the business of a well-conducted hen, except to lay eggs. It is constructed of cast iron, and in its interior is arranged a circular saw, which is turned by a powerful coil spring and clockwork. This mechanism is wound up and set, and the hen is placed in the garden. Should a bird of prey make a dive on the bird, the machinery is set in motion, and the saw revolves about 7,000 times a minute. The hen then opens and the saw emerges, slices the victim into mincemeat, and retreats back into the interior of the hen, ready for the next marauder. The performance is repeated four times for every winding, "so they say."—[Ironmongery, London.

Growth of Manufactures.

The trade statistics for 1889 of the eleven leading manufacturing industries —cottons, woolens, chemical, paper, agricultural implements, flour, lumber, glass, iron and steel and ship building—are so complete and accurate that they anticipate the census reports, and furnish an instructive indiction of the progress our entire industrial system has made in the last decade. These eleven industries in 1879 had $1,165,000,000 capital invested in them, and 844,776 hands employed; they paid out in wages $256,795,000, consumed $1,197,000,000 worth of raw materials, and showed a gross product of manufactures of the value of $1,774,000,000. In 1889 they had $1,784,840,000 capital invested, and 1,274,000 hands employed; they laid out in wages $320,689,000, consumed $1,586,000,000 worth of materials, and gave a product of manufactures of the value of $2,293,779,000. The increase has been in capital invested, $619,740,000; in the number of hands employed, 429,224; in the amount of wages paid out, $93,894,000; in the materials consumed, $397,000,000, and in the value of the product turned out of $519,779,000. There is over 50 per cent. more capital invested in the specified manufactures than there was ten years ago; 50 per cent. more hands employed; over 36 per cent. more wages paid out; over 30 per cent. more material consumed, and a nearly 30 per cent. greater product. —[Trade and Traffic.

A CONVENIENT DESK ATTACHMENT.

In our issue of July 24 our readers' attention was called to a telephone attachment, for use in writing down messages, a very great convenience for all who use telephones. In this issue we wish to call our readers' attention to a similar article, as shown herewith, for use on one's office desk or table to take the place of the ordinary desk pad which is so often mis-laid or not at hand when

needed. The construction of this desk tablet is very simple and the manufacturers, Messrs. Samuel C. Tatum & Co., of Cincinnati, O, report large demand for them; they will also supply suitable bracket piece, which could be used to attach the tablet to a wall or partition. It is the lack of such little conveniences as these which makes office work tiresome and there is no doubt that having such things at hand when needed will save much time and worry to any business man.

Steam Engines and Boilers in Prussia.

The statistics of boilers and engines in use in Prussia at the beginning of last year, have recently been published, and show very conclusively the extension of manufacturing industry during the preceding decade. On the 1st of January, 1889, there existed in Prussia 47,151 stationary boilers, against 32,411 in 1879; 27 per cent. were employed in food and drink industries, 25 per cent. in mining, metallurgy and salt manufacture, and 10 per cent. in textile industries. The number of steam engines increased from 29,895, in 1879, with 887,780 horse-power, to 45,192 with 1,508,195 horse power in 1889; or, an increase by 15,297 engines and 620,415 horse-power, the average power having increased from about 30 to 33 horse-power. Of these, 38 per cent. were employed in the food industry, 37 per cent. in mining and metallurgy, and 25 per cent. in textile trades. The number of portable boilers rose from 5,536 in 1879 to 12,177, about half of which are employed in agriculture and forest management. It will be seen that during these ten years the number of boilers has increased by 42.5 per cent., and that of stationary engines by 51.2 per cent. The manufacturing industries served by these engines have, of course, expanded in a similar proportion as the steam power, which has increased 70 per cent. The number of boilers on steamships has been more than doubled during the same period, while the power of marine engines has been more than trebled in this time. The figures quoted above show an enormous development of industries of all sorts, which, in many cases, no doubt, has been speculative, and in excess of the demand, and is the cause of the low prices and absence of profit in many branches of manufacture prevailing in Germany at the present time.

Brittle Iron.

It is well known to artisans engaged in the working of wrought iron that if a piece of the very best and toughest iron is hammered in the process of forging until it ceases to be red-hot, the effect of such cold hammering, as it is termed, is to cause the iron to become so brittle that it will in many cases break across in the process—or if it does not at that time, this process of cold hammering so removes and destroys its tenacity as to render it capable of being broken with the slightest blow. In remarking upon this process, Mr. Nasmyth, the well-known authority, expressed the opinion that, though such a practice is by no means to be considered inherently wrong, but just the reverse, the evil rests in applying such a cold-hammered piece of forge work to its purpose without having been passed through the curative process, which is simply to heat the piece of work in question to a dull red heat and lay it down to gradually cool. By subjecting wrought iron to the most violent hammering or compression at a low temperature, and then submitting the iron work so treated to the simple process referred to—heating red-hot and slowly cooling—the tenacity or shock-sustaining qualities of the article are enhanced at least twenty times. In most cases the process of hammering and swaging is necessary, in order to insure the requisite finish and fine surface, the forging so treated requiring, too, the least possible labor subsequently.—[Mining and Scientific Press.

THE complete novel in *Lippincott's Magazine* for August is contributed by that popular English author, Mrs. Alexander. The story is entitled "What Gold Cannot Buy." The many readers of Mrs. Alexander's "The Wooing O't," "Her Dearest Foe," and other charming stories will devour with pleasure this new and captivating romance. It is the story of a plucky young English girl who goes out as the companion of an elderly and aristocratic matron. There are capital descriptions of English country life among the higher classes, and the story gradually leads up to a startling and unexpected *denouement*.

AMONG THE IRON MINES.

Lake Superior Mining Notes:—

GOGEBIC RANGE.

A correspondent writes from Plummer, Wis. to the Ashland *News* that in another year this part of the range will contain some of the best mines on the Gogebic. There was quite a sensation created here by the presence of a large party of gentlemen from Cleveland and other eastern cities who are interested in a new process, just discovered, for handling banded ore with electricity. If this proves all that is expected, it will revolutionize mining matters in this section. On section 32, the White option, they are sinking a shaft 250 feet. They got a good vein of fifteen feet hematite at a depth of seventy-five feet, and are working large crews. At Sampson on section 5 they are down sixty feet and struck soft ground, mostly ore. They are working good crews. They struck ore at 100 feet and then cross-cut to the foot-wall and found six feet of clean ore. It is the intention to cross-cut again when they are down 200 feet.

The Newport, an auxiliary of the original Iron King—now Mt. Hope—made her first shipment for the season July 29. We are informed they are loading a vessel, some 1,400 tons, for Eastern parties as a sample of its output. In case this shall prove satisfactory other shipments will follow. A large stock pile was accumulated some two years since and shipments made to the Joliet Steel Co., of Chicago, but on account of there being an unsatisfactory admixture of manganese, it was rejected. We trust Eastern furnaces may find it equal to their requirements and thus add another large producer to our list of shipping mines.—[Pick and Axe.

From undoubted authority we are informed that the Schlesinger syndicate have secured a working option on the Sunday Lake mine, with the privilege of purchasing when the property shall be freed from her legal incumbrances. We can now have hopes to see this much-abused property soon take its place in the shipping lists along with the Brotherton and other neighboring mines.—[Pick and Axe.

MENOMINEE RANGE.

Work at the Mammoth Co.'s exploration on the east half of the northeast quarter of section 19, 40-18 (near this city), which has been temporarily suspended on account of two much water, has been resumed with an exceedingly healthy vigor, and good reports may soon be expected from there. The shaft, now down in mixed ore, will be sunk 75 to 100 feet, when the usual drifting and crosscutting will follow. Test pits upon the property have already almost conclusively demonstrated the existence of a big ore body, which the company expects to strike within a very short time.—[Florence Mining News.

Geo. W. Baird's new and promising exploration on the southwest quarter of the southeast quarter of section 25, 40-17, this county, is attracting great attention, having been visited by a number of mining men during the past week. All pronounced it a wonderful showing. A large area of ground has been stripped and a vast amount of hard, magnetic ore uncovered. The last assay of the ore shows nearly 60 per cent. in metallic iron, and with a low percentage of phosphorus.—[Florence Mining News.

The Norway *Current* says there is every likelihood of operations being resumed at the Quinnesec at an early date. Everything points to an early resumption of work, an option at a reduced royalty having been decided upon. This being the case it is not at all improbable that ore will be shipped from the mine this year.

At last the parties carrying on the exploration on the Miller property have met their reward, having recently struck the famous Iron River (Stambaugh) mine vein, where it extends north from that mine. The work of exploring this property commenced nearly a year ago and has been pushed with an energy that showed that the projectors had great faith in their ultimate success.—[Diamond Drill.

Recent developments at the Sheridan justify the faith that many have put in the value of that property, and it will soon become one of the producing mines of the range. It is situated on the southeast quarter of the southeast quarter of section 25, 43-35, just within the corporate limits of the village of Iron River.—[Diamond Drill.

VERMILION RANGE.

A correspondent of the Duluth *News* says the outlook in the Vermilion range was never brighter than now, and never has there been as much actual work done toward development of mines as within the last sixty days. At the Pioneer mine the do-nothing policy of the past has been changed by its new stockholders to active operations, and it will ship a large amount of ore this season. The Zenith has passed into the hands of the Bradleys and other first-class men, and will by next year become a shipper. The Miller, on section 26, has a shaft down 26 feet, and it is understood the last 4 feet runs through a solid ledge of ore. From the bottom of the shaft they have started a cross-cut toward the old test pits, working through, so far, about ten feet of the highest grade ore ever found on the range. The Camp and James, on section 33, is also showing well from present work. Trimble & Co., on section 25, are working a large crew of men in their test pits, and from wall matter and loose ore found, have every reason to be encouraged. Hibbing & Co., also on section 25, are pushing their work with good prospects. On the McDonald, in 63-13, a deal has been made with King & Wilcox, of Cleveland, who are now working quite a number of men under Capt. James Bale. This has always been considered a first-class property, and would have been opened long ago if the title had not been "muddled," but this, if reports are true, has been adjusted. James & Co., on section 30, have, for the present, shut down, awaiting new machinery. Work has been started by the Sullivan Iron Co., on section 11, and if a large outcrop of jasper is an indication of a mine, they or some one of the surrounding properties ought to have a "whale-back" iron mine. Conkey & Warren, in 64-9 and 10, are now showing good ore at their shaft and diamond drill, but not as yet in large quantities. In 62-14, the Chippewa Iron Co. have their shaft down into the solid ore on section 10. They are also working on section 9 with equal success. On section 16, Moore, Bailey & Co. have a diamond drill at work locating the "juggler," and if reports are true, have already. Ed Krelwitz is working on section 19, and every day his shaft is nearing the ore ledge, which he struck with his diamond drill. The McComber mine, in 64-14, has been leased by Capt. McComber, who is working it with a full force of men. A short time will make it a large shipper of ore.

MARQUETTE RANGE.

The shaft being sunk at the U. S. Grant, on the East Range, has reached the ledge, which is a mixed ore the same as was found to be the capping in the drill hole. The opening of the mine is now a question of but a short time.—[Herald, Negaunee.

The appearance of the deposit of ore penetrated in the drift at the Elba a few days ago continues to improve, and at present is such as to confirm the the belief of those familiar with the conditions that a profitable mine will soon be opened.—[Herald, Negaunee.

Edward Lobb has taken an option on the 40 acres between the Buffalo and Pioneer mine forties, which was sold some three years ago to the Delaware & Lackawanna Co. for $300,000, and abandoned by that corporation soon thereafter. Mr. Lobb will soon commence pumping out the old workings, and is full of faith that he will be shipping ore from the mine before the close of the current year.—[Herald, Negaunee.

Much interest is being taken in the ore concentrating plant at Michigamme, which is the invention of Mr. J. C. Fowle, of the Michigamme mine, at that place. This is the only plant of the kind in the United States that is making a success of iron ore concentration, and the gentleman certainly deserves great credit for the way in which he has succeeded, after overcoming numerous obstacles, in bringing to perfection a method for the successful treatment of the lean and badly mixed ores of the district.—[Iron Ore.

At the American mine, a few miles to the west of Ishpeming, there has lately been a vast improvement met with in the underground workings of the mine. To the west of the main shaft, on the 200-foot level, which is the first, the ore had pinched to a vein having a thickness of but a few feet, and the outlook was discouraging to the management so far as this portion of the property was concerned. Last week the ore commenced widening, and at present writing has increased to 16 feet, and is still growing larger. In point of quality it is of the best. There are two levels below this point from which the new deposit will be attacked as soon as possible. Already the product of the mine has been doubled over what it was two weeks ago, and still greater gains are looked for as soon as the ore can be reached from the lower workings. To the west of the shaft there is quite a large swamp, and it is under the latter that the new ore body has been found. Capt. Watters, one of the best hard ore miners in this region, is of the opinion that the American has now encountered its main ore body, and that the mine will soon be one of the best in the district. The new find has created considerable talk in mining circles during the week, and the chances are that there will be reason to say more of it, and of a flattering kind.—[Iron Ore.

Lake Superior Shipments of Iron Ore:—

Lake shipments of iron ore from the mines of Lake Superior, for the season of 1890, up to Wednesday, July 30th, are as shown by the appended statement, condensed from the Marquette *Mining Journal:*

MARQUETTE RANGE.

American	202	Grand Rapids	5,245	Pitts. & L. Angeline	137,938
Barnum	6,098	Humboldt	9,902	Prince of Wales	12,404
Buffalo	45,161	Imperial	9,997	Prout	6,838
Cambria	38,497	Jackson	58,500	Queen	49,383
Champion	116,549	Lake Superior	153,065	Republic	103,928
Cleveland	131,297	Lillie	17,723	Republic Reduction Co.	1,115
Cliffs Shaft	79,970	Lucy	23,808	Salisbury	58,493
Detroit	1,230	Marquette Ore Co	1 057	South Buffalo	52,160
Dexter	630	Michigamme	27,821	Volunteer	59,038
East New York	16,495	Milwaukee	19,195	Winthrop	49,725
Fitch	1,064	Negaunee	37,192		
Total, Marquette Range					1,321,986

MENOMINEE RANGE.

Aragon	10,496	Half and Half	383	Norway	31,778
Armenia	15,497	Hamilton	11,437	Paint River	26,498
Chapin	349,110	Iron River	73,516	Perkins	5,165
Commonwealth	54,324	Ludington	40,112	Pewabic	9,036
Cyclops	30,690	Mansfield	2,381	Shafer	26,577
Dunn	71,418	Mastodon	37,130	Sheridan	595
Florence	87,309	Millie	17,224	Vulcan	64,870
Great Western	40,201	Monitor	7,059	Youngstown	18,723
Total, Menominee Range					1,032,535

GOGEBIC RANGE.

Albany	14,740	Eureka	10,125	Pabst	47,651
Anvil	20,721	Father Hennepin	6,853	Palms	14,386
Ashland	2 9,875	Federal	4,308	Ruby	4,507
Aurora	121,607	First National	105	Section 33	47,975
Beaver	1,672	Germania	23,708	Superior	12,002
Brotherton	24,408	Iron Belt	56,859	Trezona	28,296
Cary	33,549	Montreal	6,630	Windsor	16,665
Colby	115,975	Mt. Hope	24,688		
Davis	270	Norrie	400,729		
Total, Gogebic Range					1,258,196

VERMILION RANGE.

Chandler	159,828	Minnesota Iron Co	259,225	Pioneer	1,795
Total, Vermilion Range					420,878
Grand Totals					4,033 595
To corresponding date of 1889					3,391,327

With a gain, which practically amounts to 700,000 tons, 1890 looks down upon 1889, which was previously the banner year of ore shipments for the Lake Superior region. The exact figures, according to the *Mining Journal's* reports, are 699,129 of gain for this later year, of the series of Anno Domini. If railroads, docks of shipments, vessels of transport and docks of reception had not been so obviously and painfully deficient, the triumph of the present over the past would have been even more conspicuous than the record shows. The Lake Superior mines started out happily handicapped by the obligations of contracts which included their total possible output for the year. No allowance seems to have been made for the incidents and accidents of transportation, and the cold autumnal wind, which closes the navigation season of 1890, will be likely to find many mines in arrear of contract deliveries.

THE COLLES PATENT IMPROVED HEATER AND PURIFIER.

The accompanying engravings illustrate the above named heater, made by E. G. T. Colles & Co., 25 South Canal St., Chicago, Ill., who for years observed that while the tubes of heaters had to be renewed frequently, their cylinders were practically sound as when made. It was also observed that impurities accumulated on the tubes, and especially on the tube sheet. Though a blow-off pipe in some cases was provided and used, the heat of the steam underneath the tube sheet hardened the impurities into scale between the tubes so that the heaters lose their heating efficiency. The makers, presumably to curtail the cost of construction, riveted in the head, instead of making it removable, and provided no means of access, except, perhaps, a small hand-hole—practically useless for cleaning purposes. In consequence of so much of the water being displaced by the tubes, the quantity contained in such heaters is too small to remain in them sufficiently long to thoroughly heat or to separate and settle the impurities to any great extent. It was to overcome these and various other defects that the Colles heater was designed. The destructible tubes as a heating medium were replaced by the practicably indestructible cylinders, thus doing away also with the objectionable tube sheet and a multitude of tube joints, substituting for the steam receptacle beneath the tubes a cool settling chamber for impurities. Heads also have been provided which may be removed at pleasure to give access to the water chambers, without disconnecting the exhaust pipes or taking down the heaters. A jacket of steam is formed outside the water chamber, so that the heat acquired from the exhaust may not be reduced by contact with the surrounding atmosphere. As will be seen from its construction, the Colles is not intended to be a low-priced heater. No pains or expense is spared in its construction, the material and workmanship being the best the market affords, so as to produce a strictly first-class article, the first cost being a secondary consideration, both with the manufacturer and the prudent purchasers of modern steam plants. Their aims respectively being to produce and procure a heater that will not only boil the water with exhaust steam, but one that will last without repair as long as the rest of the plant is to be used, and have the various advantages possessed by the "Colles," a few of which are named above.

Fig. 1 shows a vertical section of this heater, made of four steel cylinders. The water enters the pipe A to its top, passes downward very slowly through the large central water chamber B B, so that it remains in contact with the surrounding heating cylinder a long time and passes slowly upward through the annular water chamber C C, and out to the boilers below the seam, through the pipe D, heated to boiling point. The water, already hot when it enters the annular chamber in the form of a thin sheet, quickly absorbs the heat of the steam at each side. The exhaust enters at E, half of it passing around between the two outer cylinders, forming the steam jacket, while the other half enters the inner steam chamber F, both passing over all the cylinders at the same time and out at G, thus insuring equal expansion throughout. Or, it may enter at G and pass out at E. The two outer cylinders are riveted to two faced rings, one at each end, in which the studs are set. The heads also are faced so as to make a perfect joint. H is the scum blow-of; I, mud blow-off; J, hand-hole; K, drip, for the condensation from both steam chambers; L, strengthening rings; M, supports; N, bolts bearing against, though not attached to, the surrounding cylinder; while the water passes on its downward course, from the central to the outer water chamber, such heavy impurities as are separated by the heat, are deposited into the settling chamber and are blown out. It is plainly seen that this heater holds about four times as much water as it would if it were made with tubes, at the same time giving even more heating surface and no cooling surface. The water is passing over the heating surfaces only one-fourth as fast. In other words, it is remaining in contact with the heating surfaces four times as long, so that its heating surfaces are as effective as the heating surfaces of a heater containing only

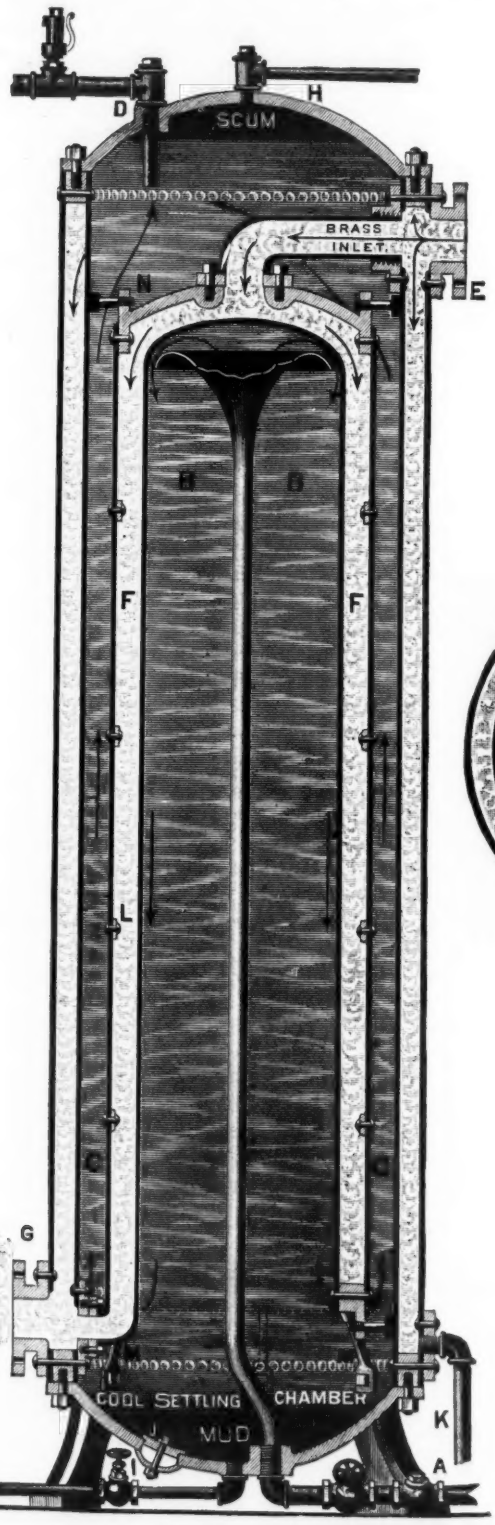


Fig. 1.

Fig. 2.

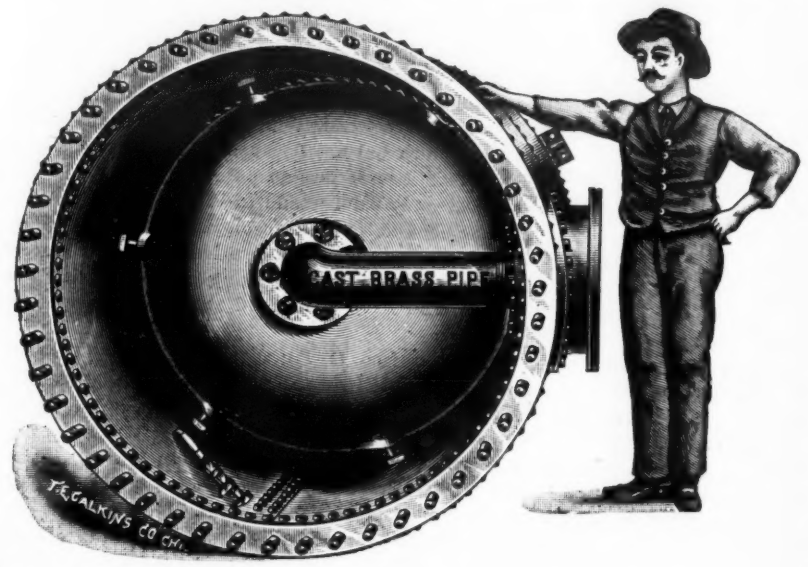


Fig. 3.

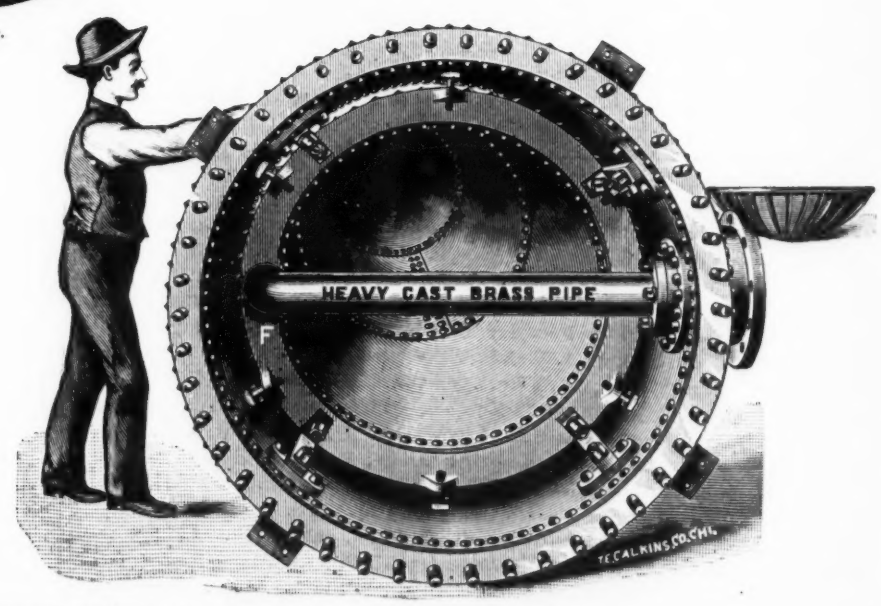


Fig. 4.

COLLES PATENT IMPROVED HEATER AND PURIFIER.

one-fourth as much water, while the impurities have four times as long to separate and settle. Fig. 2 shows a cross section between the exhaust ports A, feed pipe; B B, central water chamber; C C, outer water, with the steam surrounding both. Fig. 3 is made from a photograph of a heater 56 inches in diameter and 20 feet long, and shows a perspective view, with the upper head removed. The object is to show the top interior connection made with the heavy cast brass pipe, which being soft would in itself admit of inequality of contraction and expansion if any existed. One end of this brass pipe is threaded into the flange riveted to the cylinder. The flange on the other end and the inside top head are faced, a thin copper gasket is placed between them and they are securely connected together by tap-bolts, so as to make a perfect and permanent joint. This substantial yet detachable joint is a most desirable one and is better shown in section in Fig. 1. Fig. 4 is also made from a photograph of a heater of the same size and exhibits an interior view from the lower end, with the settling chamber removed and lying some 20 feet away. The object of this engraving is to show the central water chamber and the interior construction of the lower end of the heater, especially the cast brass outlet pipe, threaded into the steel ring which forms the bottom of the inner steam chamber F, and extending across the central water chamber to the flange riveted to the cylinder. Both flanges are faced, have a thin copper gasket between them and are connected with top bolts. The centering bolts and supports are also plainly shown. This heater is also patented in Canada and Europe. Several of them have already been made in Winnipeg for mills in the Northwest, and not a few have been shipped to foreign countries. Though a large number of the Colles heaters are in use, comparatively few of the latest improvements, as shown in the engravings, are among the number. The names of a few of the concerns who have purchased the Colles heater are subjoined:

Crane Elevator Co., second order (300 H. P.); City of Chicago, Electric Light Plant (400 H. P.); Chicago Malleable Iron Co. (400 H. P.); Jacob Beidler (250 H. P.); J. K. Russell, box factory, etc. (250 H. P.); Wahl Bros., brick works (300 H. P.); Baker's Theatre Building (150 H. P.); Chicago Steel Works, manufacturers, (250 H. P.); Crane Bros. Mfg. Co., elevator works; Warren F. Leland, Leland Hotel (100 H. P.); Hintze & Weise, sash factory (150 H. P.); W. H. Bunge, vinegar works (100 H. P.); Jonathan Clark, mfg. block (150 H. P.); C. E. Jorgenson, furniture (100 H.P.); Greenlee Bros. & Co., machinery; Baker & Smith Co., steam heating, etc.; Goulds & Austin, forge works (150 H. P.); C. L. Willoughby, iron building (100 H. P.); John B. Mallers' wholesale bldg. (100 H. P.) John York, dry goods (100 H. P.); Rice & Whitacre Mfg. Co. (100 H. P.); S. I. Pope & Co., steam heating, Amos Grannis, warehouse; Cribben, Sexton & Co., stove works; Chicago Tyre & Spring Works, mfrs.; American Express Co., main buildings; James B. Clow & Son, machinery, etc.; Chicago Sewing Machine Co., mfrs., Temple Pump Co., pump works; North Chicago City Railway Co., shops; Chicago, Mil. & St. P. R. R. Co., warehouse; Illinois Street Gas Co.; A. Loeb's building; Kolben Johnson, founder; McVicker's Building; The A. N. Kellogg Newspaper Co.; The Foreman Building; The Robinson Brick Mfg. Co.; H. Z. Mallen & Co., parlor suite frames; D. H. Fritts & Co., molding (100 H. P.); E. F. Osborn & Co., steam heating; Selz, Schwab & Co., mfrs. of boots and shoes; Murphy & Co., varnish works; C. F. Wardell; Chicago Wood Finish Co.; Norton Bros., tinware; Central Steam Laundry Co. (100 H. P.); Leo. Austrian & Co., furniture factory (150 H. P.;) National Smeltirg & Refining Co,; H. H. Scoville, machinery; Ernst Heldmair, stoneyard; Liquid Carbonic Acid Mfg. Co.; Chicago, Ill. Badenoch Bros., planing mill, etc., Englewood, Ill. Aurora Smelting & Refining Co. (150 H. P.), Aurora, Ill. Addyston Pipe & Steel Co. (500 H. P.), Addyston, O. Roth, Meyer & Co., packers, 2d order; Laidlaw & Dunn Co., machinery; L. Schreiber & Sons' Co., iron works; J. G. Sohn & Co., brewery (350 H. P.); Buckeye Brewing Co., brewers; Kippendorf, Dittman & Co., 3d order; The Hazen Mfg. Co., wire works; Methodist Book Concern (100 H. P.); Tennessee Lumber Co. (100 H. P.); Blacker, Gerstle Co., shoe factory; The I. & E. Greenwald Co., Cincinnati, O. Ashtabula Tool Co. (100 H. P.), Ashtabula, O. The Northwestern Mutual Life Insurance Co. (250 H. P.); Kieckhefer Bros. & Co. (200 H. P.); Moore Mfg. & Foundry Co.; E. Mariner (100 H. P.); Cudahy Bros., packers (400 H. P.); F. A. Walsh & Co., tinware (125 H. P.); Weisel & Vilter Mfg. Co., machinery; Kipp Bros., mattress factory (150 H. P.); Davidson's theatre (165 H. P.); Chicago & Northwestern R. R., new depot, Milwaukee, Wis. Mineral Point Zinc Co., zinc works, Mineral Point, Wis. E. H. Pease Mfg. Co.; Ansted & Higgins, spring words; Racine Gas Light Co. (100 H. P.); E. Klinkert, brewery (100 H. P.), Racine, Wis. Swift Electric Light Co. (400 H. P.), East Saginaw, Mich. Cable Railway Co. (100 H. P.), Grand Rapids, Mich. Bee Publishing Co. (250 H. P.), Omaha, Neb. Anderson & Connell, Los Angeles, Cal. *Pioneer Press* (450 H. P.); Aberdeen Flats (100 H. P.), St. Paul, Minn. Winona Hotel Co. (100 H. P.), Winona, Minn. Broadbent, Archambo & Co., Minneapolis, Minn. W. Duke, Sons & Co. (165 H. P.), Durnam, N. C. A. Batchelder (165 H. P.) Helena, Ark. The Knapp Stout Co., Fort Madison, Ia. City Water Works, Dodge City, Kan. City Water Works, Manhattan, Kan. Wichita Schuyler Electric Co.; The Wichita Electric Light & Power Co., Francis Whittaker & Sons, packers (500 H. P.), Wichita, Kan. Sheboygan Electric Lighting Co. (150 H. P.), Sheboygan, Wis. Armstrong Mfg. Co., wooden-ware (200 H. P.), Petoskey, Mich. Ice Factory (100 H. P.), Brown & Leshmett (125 H. P.) Frederick, Md. Ice Factory (165 H. P.), Belige, British Honduras. W. Duke & Sons, 2d order 200 (H. P.); Geo. I. Roberts & Bros., New York. Stock Yards, packing house (250 H. P.), St. Joseph, Mo. Barbour & Starr, planing mill (150 H. P.), Toledo, O. Ice Factory (100 H. P.) Harrisburgh Ice Machine Co., mfrs. refrigerating apparatus, Harrisburg, Pa. Westinghouse Air Brake Co. (1,000 H. P.), Pittsburgh, Pa.

ENGLISH parties from Brazil, were in Lowell, Mass., the recently, ordering machinery for a new cotton mill in that country to be established at Cuxias. This is the third order that has been placed in New England for cotton machinery to go to South America within a short time.

SOUTHERN IRON ORES.

The iron ores of the South are not only extremely abundant, but occur in several widely-separated fields, writes Prof. Shaler to the *Arena*. The Shenandoah district of Virginia and the neighboring valley of the Roanoke, Western North Carolina, Eastern Kentucky and Tennessee, Northwestern Georgia and Northern Alabama, all districts belonging to the system of the Appalachians, abound in workable deposits of this mineral. Texas, Arkansas, Missouri, also contain valuable iron ores, but they lie remote from deposits of good coal. The peculiar advantage of the Appalachian districts is found in the fact that the ores lie in the neighborhood of excellent coal beds, which, in certain cases, can be used as it comes from the mine, or may be made to serve the needs of the smelter after it is converted into coke The average distance of the iron ores from the coal needed to reduce it to the metallic state does not exceed 100 miles. The ores of the Lake Superior district have to be transported from seven to ten times this distance to find an appropriate fuel. It is true that the average richness of the Lake Superior ores in metallic iron is probably nearly one-third greater than those found in the Southern States, and the former yield Bessemer iron, which, save in rare instances, cannot be produced from the Southern deposits. On the other hand, the Southern ores are generally won with considerable ease. Enough ore to make a ton of iron can at many points be mined and put in the furnace at a cost of between $1 and $2, while to bring the same amount of raw material from the earth about Lake Superior to the smelting point costs, at the present time, from $9 to $12. Moreover, there is a method of making steel known as the Basic process, which, for general purposes, is as good as the Bessemer system. This method is well proven, and, with the expiration of certain patents, which in a few years will cease to be valid, will doubtless come into use in the Southern States.

The peculiar ease with which the Southern ores are mined is in good part due to their geologic conditions. They are generally in the form of true beds, which once were limestones, and have been converted by percolating waters containing iron in a dissolved form into iron ores. Being beds of this origin, the deposits are more continuous than those of other nature, such as those about Lake Superior, where the ore occurs in much more irregular deposits. Moreover, the Southern country was not occupied by the glaciers of the last ice period, thus the soft oxidized ores were not worn away as has generally been the case in the glaciated fields, nor have the outcrops been hidden by the deep accumulations of drift materials which are so common in Northern districts. In parts also their advantageous conditions are due to the fact that the Southern climate permits work to be carried on in open pits throughout the year, while such uncovered openings would not be workable for more than seven months of the year in Northern climes.

Hollow Cast-iron Bricks.

What are termed hollow cast-iron bricks form the subject of a recent German patent described in the technical journals, the article being the invention of an Erfurt mechanic. As the name indicates, they are made of regular brick form and size, the walls being 0.12 inch thick, but no mortar or other binding material is intended to enter into their use, the method of fastening adopted being as follows: The upper and lower sides of the bricks are provided with grooves and protecting ribs, which fit into one another easily and perfectly, so as to make a uniform and complete union or combination. There are in addition two large circular openings in the upper side of each brick, arranged to receive suitably formed projections on the lower side of the brick above, one of these projections being also hooked shape, thus securing a more secure hold; and in order that the joints be made and remain air and water-tight, a fluid is applied to the surface of the bricks with a brush. The non-conducting air spaces in the bricks, and the ease with which they may be put together and taken apart without injuring them, are cited as special advantages in their favor as a substitute for ordinary bricks and brick construction.—[Manufacturers' Gazette.

Current and Coming Exhibitions.

Foreign fairs are now open as follows—the dates indicate the times of opening and closing:

Bremen, International Machinery, June—August, 1890.
Frankfort-on-the-Main, Electrical, May 1, 1891.
Leeds, International Engineering and Mining, May 21—October.
London, French International, May—October.
London, International Mining, July 16—September, 30.
London, Royal Military, May 7, 1890.
Vienna, Agricultural Machinery, May—October, 1890.
The following will open at the dates named:
Kingston, Jamaica, January 27, 1891.
Liege, International, July—September, 1890.
St. John, N. B., September 24—October 4, 1890.

Steam Made with Oxy-Hydrogen Gas.

A recent dispatch from Superior, Wis., states that a prominent chemist of San Francisco, then in Superior, is preparing to make public a discovery which will work wonderful changes in the economy of steam transportation. His scheme is to dispense with the use of fuel of all kinds. He has devised an apparatus by means of which water can be utilized as fuel. By means of his chemical machine the water is to be resolved into its elements, oxygen and hydrogen. These gases are to be burned by means of an oxy-hydrogen machine, producing intense heat. The machine is placed adjacent to the boiler, and will thus generate steam to propel the vessel.

THE Nickel Plate makes a low rate to G. A. R. Encampment at Boston. Special train August 10. 224 Bank St., 598 Pearl St. and depots.

TESTS OF STEEL PLATE.

The recent investigation by the Government into the quality of steel plates made to its order in a local mill has drawn more or less attention to the question of Governmental inspection, and to the manner in which the tests into the suitability, durability, etc., of steel for naval purposes is made. Pittsburgh has gained such pre-eminence for the quality of its iron and steel commodities that it is not without some demur that citizens find a disposition on the part of the Government to cast a shade of doubt over the quality of its output of steel plates.

Recent writers treating of the tests applied to steel plates for naval purposes hold that there will be no durability or safety in steel vessels of war until there is an established constitutional make-up of the different varieties of iron and steel that is understood by metallurgists and engineers, and until there is a recognized practical science of the art of steel making.

These hold that the tests now in vogue are insufficient, and that Government should establish a standard, based upon the chemical electrical properties of metals on the plea that something more than a mere mechanical test of iron and steel for armor plates is required.

The tests employed at Homestead are of three kinds, namely: Surface, chemical and physical. The surface test, as its name implies, is purely superficial, but withal very necessary. Imperfections may exist in the plates which the chemical and physical tests would fail to discover, such as snakes, pittings, laminations and cobblings. Snakes are scarcely apparent fissures due to the apparent homogeneousnesss in the material. Pitting is the result of a soft spot in the plate and into which a piece of scale has been rolled. Vigorous tapping with a hammer over the surface of the plate suffices to bring to view the soft spot in the plate. Cobbling is due to an imperfection in the rolls whereby the plate is unevenly rolled, being thicker or thinner in some parts than others. Every plate that passes the rolls is inspected for these imperfections, but the Homestead mills make such a quality of steel, and by such improved machinery, that few plates, if any, are found wanting on these accounts.

Tests as to the chemical properties of the material are made both by the firm and by the government officers. The firm tests for carbon, phosphorus, manganese and sulphur, and hands a report on each heat to the inspectors. They, in turn, make two special tests for sulphur and phosphorus. For example, ship plates are ordered of quality of about .22 of carbon, .40 of sulphur, .60 of manganese, and .40 of phosphorus. One point above or below these figures on carbon, and from .055 to .070 on phosphorus. In the test phosphorus must show above .060, and sulphur above .040, else the plate is rejected. The chemical analysis of each heat is duly recorded, both by the firm and government inspectors. Each heat has its number, and at any moment, however long afterward, or wheresoever the plate may have been delivered, the chemical constituents of the plate may be ascertained by reference to the records.

The physical test shows the actual strain or pressure which the plate will bear. Tests are made of four out of the 20 or 25 plates in the heat of ship plates.

The government requirements for these plates are that they shall show a tensile strength of at least 60,000 pounds, and 25 per cent. reduction in eight inches without breaking. In the test for tensile strength one piece of the four may fall to 58,000 pounds, or one piece may stand only 23 per cent. of reduction without breaking if the other three fill both requirements. But if two plates out of the four fail, one in tensile strength and the other in its percentage of reduction, the entire heat is rejected. This is the first physical test to which the plates are subjected.

Ship plates are subjected to a still more severe test. Pieces from two of the four plates are turned over flat upon themselves, and under such pressure as to become almost one piece. The steel is cold when so bent. This is called the cold bent test. Neither flaw nor crack must appear at the bend, else the heat will be declared rejected. Strips from the other two of the four plates from the heat are subjected to the quenching test.

This is declared to be the hardest of all. The strips are placed in a furnace and heated to a cherry red; next dipped in a tub of water of a temperature of 82°, and then bent over flat to about one-half of its thickness. As before, it must not exhibit any imperfection at the bend. As a practical illustration of the test, a strip of plate about 12 inches long, slightly over 2 inches wide and about ⅜ thick, was, for the benefit of the *Dispatch* representative, subjected to the trial. The strip was placed between the jaws of a hydraulic press, which, on application of the power, commenced to draw the piece out. It broke at a pressure of 63,400 pounds, or at a pressure equivalent to 66,400 pounds to the square inch. The area of the piece was .9548, or nearly a square inch, and was reduced at the breaking point so 57.6 per cent. of its size. It was elongated 2.2 in 8 inches, or 27½ per cent.; in other words, the piece stretched from 8 inches to 10.2 inches before breaking. It will be seen that these figures exceeded the requirements to pass the inspectors. The piece was subsequently bent, and so closely that light could not pass between. The bend was smooth as glass, and without the faintest indication of strain or break.

The specification for high boiler plates calls for a tensile strength of from 58,000 to 67,000 pounds. Transverse pieces must show 22 per cent. of elongation, and the longitudinal stretch must be at least 25 per cent. The elastic minimum limit for these plates is 32,000. These plates are subjected to the cold bent test as already described. For low boiler plates a tensile strenth of from 50,000 to 58,000 pounds is required, with 26 per cent. longitudinal and transverse elongation. These plates are tested by the quenching process, as already described, as being the most severe to which they can be submitted. Protected armor plates are required to stand, singly, a pressure of 75,000 pounds. Tested by heats these plates must stand 80,000 pounds pressure, and an elongation of 18 per cent. in two inches. The plates are three inches thick and turned down in a lathe to two inches by half an inch, and then tested as in other cases. For every 1,000 pounds less than 80,000, where plates are tested singly, the elongation must be augmented by .5 of one per cent.

A most careful registry of all plates destined for naval uses is kept by the Government officials. Every test piece carries three stamps; that of the firm, the Government mark, and the inspectors private mark. Even after this careful inspection at the works, the Government reserves to itself the right to reject plates on delivery at the yards.

Lieutenant Tichbohne has charge of inspections in all mills in this district. Another lieutenant and assistant to do duty at the Linden Steel Works, and still others at Oliver's mills. The force at Homestead comprises a chemist, who also ranks as lieutenant, and an office force of about eight.—[Pittsburgh Dispatch.

Bessemer Iron to be Made by Southern Furnaces.

A number of new furnaces which are now building at Eastern points in Tennesee, Southwest Virginia and Southeast Kentucky will be of particular interest to the iron men of the South, inasmuch as their product will be something new to the Southern iron market. Two of these furnaces are located at Roanoke, Va.; one at Big Spring, Tenn.; one at Graham, Tenn.; one at Bristol Tenn.; two at Embreeville, Tenn.; one at Big Stone Gap, Va.; one at Pulaski, Tenn.; one at Radford, Va.; one at Johnson City, Tenn., and there are three others in the vicinity of Johnson City. These are only a few of the many furnaces in contemplation in this section of the country. The product of these furnaces will be what is known as Bessemer iron, and they will be pioneers in the production of this iron in the South, as steel iron has never before been produced in this section to much extent. The sites for these furnaces are wisely chosen, as their proximity to the famous Pocahontas coke ovens will enable them to us this coke, which is the best made in the United States for the manufacture of pig iron. Bessemer iron can be made better and cheaper here than in any other section of the country. This being one of the finest agricultural districts in the country, offers cheap and good living to the laboring classes. The climate is pleasant and healthy, and everything necessary to the comfort of civilized man may be produced in that region. The number of furnaces which are being constructed will bring into that region an immense amount of capital, which will, of course, result in the establishment of other industries and developments and improvements of all kinds, and undoubtedly the near future will show the development of industries in that section never before considered in the South.

There have been millions already invested in that section, and much more capital is expected in the near future. The furnaces in this district bid fair to outnumber those of the Birmingham district, and it does not require much foresight to anticipate the results which must certainly follow within the next few years.—[Chattanooga Correspondence Baltimore Manufacturers' Record.

The Testing of Iron and Steel.

If a fracture of iron gives long, silky fibers of a leaden hue, the fibers cohering and twisting together before breaking, it may be considered a tough soft iron. A medium, even grain mixed with fibers is a good sign. A short, blackish fiber indicates badly refined iron. A very fine grain denotes a hard, steely iron, apt to be cold-short, and hard to work with the file. Coarse grain with brilliant crystalized fracture, and yellow or brown spots, denotes a brittle iron cold-short, working easily when heated. This iron welds easily. Cracks on the edges of bars are a sign of hot-short iron. Good iron is readily heated soft under the hammer, and throws out but few sparks. Nitric acid will produce a black spot on steel; the darker the spot the harder the steel. Iron, on the contrary, remains bright if touched with nitric acid. Good steel in its soft state has a curved fracture and a uniform gray luster; in its hard state, a dull, silvery, uniform white. Cracks, threads, or sparkling particles denote bad quality. Good steel will not bear a white heat without falling to pieces, and will crumble under the hammer at a bright red heat; while at a middling heat it may be drawn out under the hammer to a fine point.—[Glasgow Enquirer.

JOHN MUIR contributes an important paper to the August *Century* on "The Treasures of the Yosemite." The article is richly illustrated, and there are maps to indicate the boundaries of the proposed enlargement of the Yosemite Park by the creation of a new national park to preserve the sources of the waters that are such an indispensable feature of the old park. Other illustrated features of the number are W. J. Stillman's papers on the "Italian Old Masters," Sandro Botticelli, with three full-page engravings by Cole; an entertaining account by Gustave Kobbe of "The Perils and Romance of Whaling," and the second part of Harriet W. Preston's "Provencal Pilgrimage," illustrated by Pennell. President Eliot, of Harvard, contributes "The Forgotten Millions," a study of the common American mode of life, as typified by the permanent native population of Mt. Desert. In "Topics of the Time" there is a discussion of the "Distaste for Solitude," of "The New School of Explorers," as exempified by Stanley, and a brief comment on Mistral and his poetic country of "Provence."

BOILER feed pipes should be of brass, because they do not corrode, and they are better able to resist changes of temperature. The only objection to copper feed pipes is the supposed galvanic action they set up, which causes the boiler to deteriorate. Steam pipes ought to be of copper, both for their durability and absence of corrosive action. Their cost alone prevents their general use. The best blow cocks are asbestos packed.

Nickel Plate.

Excursion tickets will be sold to Boston at special low rates on August 8th, 9th, 10th and 11th.

INDUSTRIAL SUMMARY.

New Enterprises :—

At Luray, Va., a foundry and plow manufacturing company have been formed with $25,000 capital stock.

The Bristol Pioneer Steel Plant & Rolling Mill Co. have been organized at Bristol, Tenn., to build two Bessemer and two basic steel furnaces.

The Valley Engine & Machine Co. has been incorporated at Lynchburg, Va., with W. P. Riley, of Williamsport, Pa., as President; capital, $150,000.

At Newark, N. J., a new saw manufacturing company, with $250,000 capital, of which Geo. A. Halsey is President, has been organized, and will soon erect a large factory.

The Edison Industrial Works have been incorporated, with a capital stock of $1,000,000, of which $550,000 is preferred. The company will operate near Bloomfield, N. J.

The Howard Harrison Iron Co. has been formed at St. Louis, Mo., capital $500,000, to erect extensive plant at Bessemer, Ala., for the purpose of manufacturing iron piping.

The Pan-Diamond Saw Co. has been incorporated at Alexandria, Va., with H. A. Parr, of New York City, President, and J. M. Glover, of St. Louis, Mo., Secretary. The capital stock is $500,000.

The Goshen Rolling Mill Co. have been incorporated at Goshen Bridge, Va., with $300,000 capital stock. The officers are: Henry Stephen, President, and J. Y. Heckman, Secretary. This company is backed by Philadelphia capital. The construction of the plant will not be long delayed.

Bristol, Conn., is likely to receive a new industry. The Turner Furnace Co., now located at Meriden, are contemplating a removal to Bristol. The company manufacture a patent furnace, and have been working on a small capital which it is desired to increase as well as the facilities for manufacturing.

A corporation known as the Coggeshall Manufacturing Co., with a capital stock of $300,000 and a paid in capital of $3,000, have been organized at Auburn, Me., for the purpose of manufacturing machinery, spindles, etc. The officers are: President, Edward Lyon, Jr., of Melrose, Mass.; Treasurer, E. C. Lawrence, Boston.

A charter has been granted to the Bradley-Barker Manufacturing Co., of Pittsburgh, for the manufacturing and dealing in gas regulators, gas and steam supplies, etc. The directors of the new concern are: Jas. A. Bradley, of Bellevue; John E. Ridall, E. L. Maxwell, E. F. Houston and William Barker, Jr., of Pittsburgh.

The following are among the new companies which have been granted licenses of incorporation in Illinois: Columbia Street Car Co., Chicago; for the manufacture and operation of cars and machinery and railway appliances; capital, $1,000,000; incorporators, Patrick R. McArdle, Freeman J. Short and Arthur H. Walker.—Chicago Watch Tool Co., to manufacture and sell machinery; capital, $10,000; incorporators, Julius Heinemann, Louis O. Keltz and Emil Heineman.—Chicago Railway Device Co., Chicago; to manufacture devices and improvements for railroads; capital, $100,000; incorporators, William P. Fullerton, Marcus Hitch and Maj. McGregor.—C. H. Mitchell & Co., Chicago; to manufacture elevators, etc.; capital, $100,000; incorporators, Charles H. Mitchell, Wallace, Thomas and John P. Ahrons.

Enlargements, Additions, Removals, Etc.:—

The Batesville Iron Works, of Batesville, Ark., intend adding a foundry.

The Gulf Wire Mill Co., of New Orleans, La., have increased their capital stock to $100,000.

The Wilkesborough (N. C.) Manufacturing Co. will enlarge capacity and add new machinery.

Messrs. Schoenberger & Co., Pittsburgh, Pa., are making extensive improvements to their works.

The Cincinnati Corrugating Co., of Piqua, O., are adding a galvanizing department to their sheet mill.

Jones & Laughlin, Pittsburgh, Pa., expect to begin the erection of a third furnace about September 1st, to cost about $200,000.

The Casey Boiler Manufacturing Co., of Chattanooga, Tenn., will, it is understood, make extensive additions to the present plant.

The Pittsburgh Mill, Mine & Electric Equipment Co., of Pittsburgh, Pa., have increased their capital stock from $10,000 to $100,000.

The Lockwood Manufacturing Co., of East Boston, manufacturers of machinery, will make extensive additions and improvements to their plant.

A malleable iron plant is shortly to be added to the foundry and machine shops of the Ross-Mehan Brake Shoe Foundry Co., at Chattanooga, Tenn.

Messrs. Ireland & Hughes, Pittsburgh, Pa, manufacturers of oil-well tool supplies, contemplate the erection of a 50-foot addition to their forge department.

The Lookout Boiler Works, at Chatanooga, Tenn., have purchased additional space and are now enlarging their plant and adding much new machinery.

The Basic City (Va.) Car Works Co. is erecting machine shops and foundry 60x100 feet, planing, tongue and grooving mills 60x100 feet each, erection shop 60x143 feet, and painting shop 17x143 feet.

The Morse Twist Drill & Machine Co., of New Bedford, Mass., will erect a brick building 164x35 feet, two or three stories high, and an addition 70x40 feet, one story high. The main building will be 30 feet high, and the addition 18 feet; and they will be used as a machine and blacksmith shop.

An experimental furnace is being erected at the Black Diamond Works of Park Bros. & Co., for making steel direct from the ore by the Adams process. The process is controlled by the Steel & Iron Improvement Co., of this city, and has been tried at the works of the Premier Steel Co., at Indianapolis, with what is claimed to be very satisfactory results.—[American Manufacturer, Pittsburgh.

The long abandoned charcoal furnace, once known as the Northern furnace, at Chocolay, near Marquette, Mich., is being rapidly reconstructed, and will probably be ready for operating some time in September. The furnace has lain idle for seventeen years, and few members of the iron trade expected that it would again resume active operations. The owners expect to turn out about sixty tons of pig iron a day.

Furnaces and Works Starting Up :—

Laughlins & Co., Limited, of Pittsburgh, Pa., started their Eliza No. 3 furnace on July 26 after rebuilding and adding new fire-brick stoves. The furnace is now 15x75 feet.

The first blow in the new Bessemer plant of the Pittsburgh Steel Casting Co., at Pittsburgh, Pa., was made last week. The new buildings adjoin the river end of the main foundry, and contain a 9-ton converter, a 54″x60″ upright blowing engine, and other necessary machinery for making and handling heavy steel castings.

Fires and Accidents :—

The works of the Chicago Crucible Steel Casting Co., at Chicago, burned July 29. Loss, $50,000.

The Monitor Plow Works, at Minneapolis, were totally destroyed by fire on Monday, July 28. Loss, $100,000.

General Industrial Notes:—

A press dispatch from Steubenville says: The Spaulding Iron Works, at Brilliant, O., were reappraised Tuesday at $90,000. It is thought that the English syndicate which purchased the Ætna Iron Mills, at Martin's Ferry, will bid in the Brilliant mill. It is understood that the syndicate will put $250,000 in improvements and enlarge the mill.

The Garvin Machine Co., Laight and Canal streets, New York, manufacturers of milling and screw machinery, drills, lathes, electrical goods, etc., announce that the Parkin & Bosworth Co., 9 and 11 South Water streets, have been appointed the agents for Cleveland and this section. All information relating to machinery or catalogues will be cheerfully answered by them.

W. R. Santley & Co., Wellington, O., announce that the hardwood lumber business heretofore conducted by them will, after July 30th, be continued by the Santley Lumber Co., with principal office at Wellington, O. The officers of the new company are: W. R. Santley, President; M. McDermott, Vice-President and Treasurer; D. A. Willard, Secretary. The Santley Lumber Co. will buy and sell and manufacture chiefly plain sawn and quarter sawn white and red oak, wagon timber, railway and bridge timbers, hickory, poplar and gum lumber, cypress, black walnut, cherry, ash and other hardwoods. They have access to excellent timbers in Ohio, and own fresh timber tracts in Arkansas. They have good band mills and skilled workmen.

The Lane & Bodley Co., Cincinnati, O., have in contemplation some extensive changes in their establishment which will be equivalent to a large addition to their works. They propose to put in two new travelers, which will cover the large erecting floors, heavy tools and a portion of the foundry devoted to heavy work, also a loading platform. This shop is very busy at the present time, they having on hand a 30″x60″ Corliss engine for the Des Moines Electric Light Co.; one of same size for Studebaker Bros. Manufacturing Co., South Bend, Ind.; two 28″x60″ and one 24″x60″ for the Cincinnati Street Railway; one 20″x48″ for the Cincinnati Incline Plane Railway Co., one 22″x48″ for Henry Pearce Sons' Cotton Mills; one 22″x48″ for the United States Bung Co.; one 20″x48″ for the Monroe (N. C) Cotton Mills; two 24″x48″ for the Seattle Cable Railroad, and others of less size.

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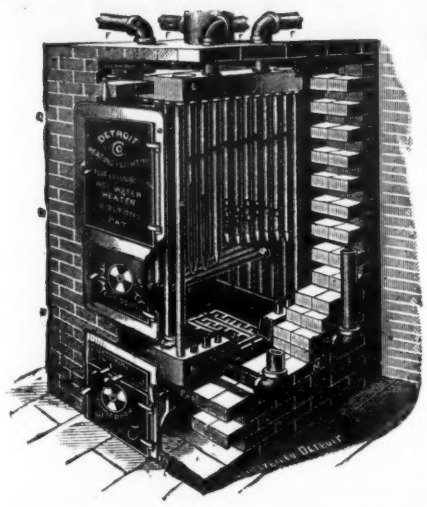

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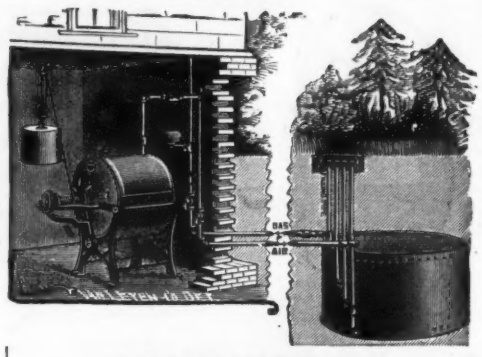

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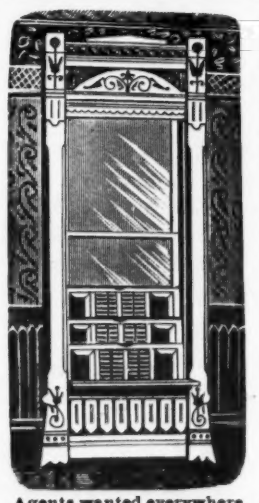

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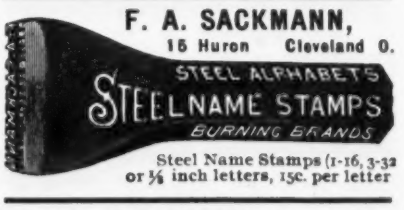

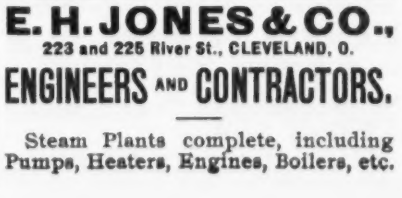

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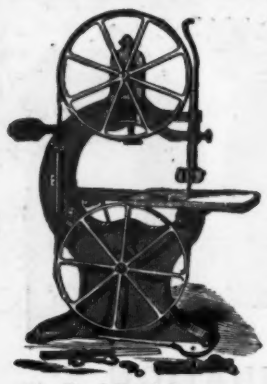

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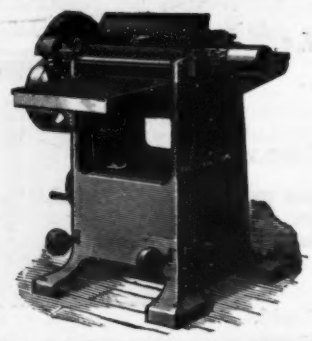

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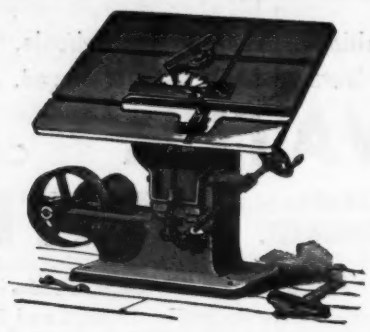

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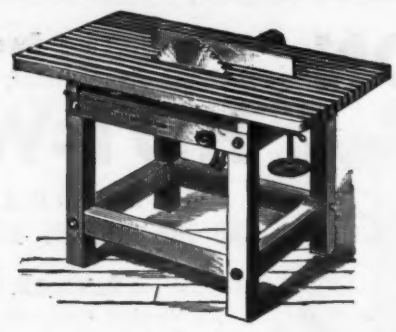

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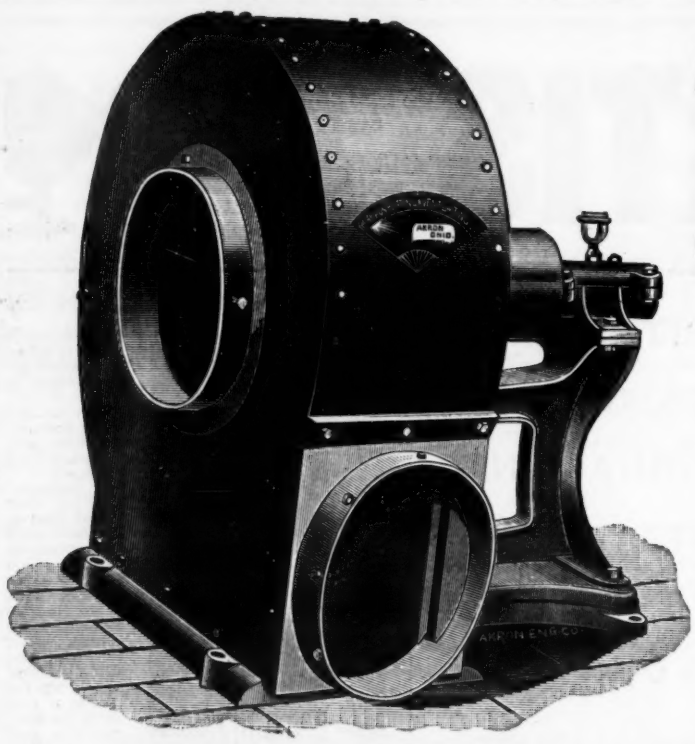

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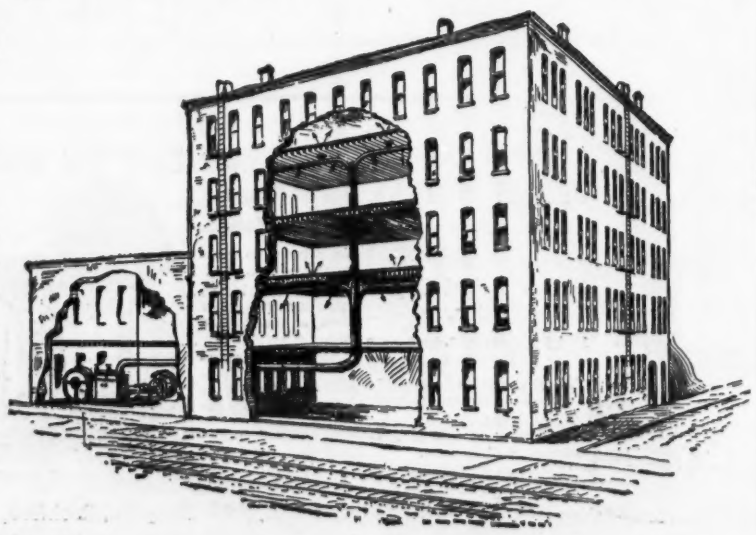

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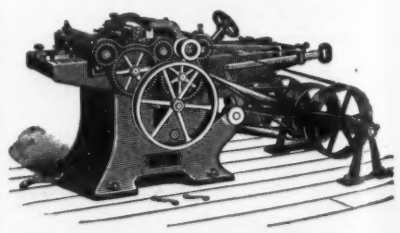

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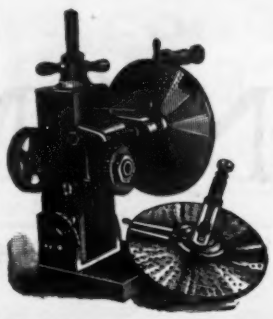

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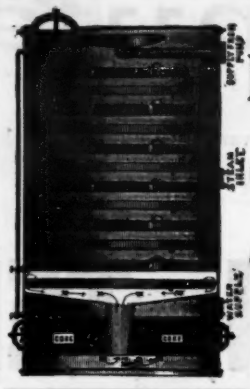

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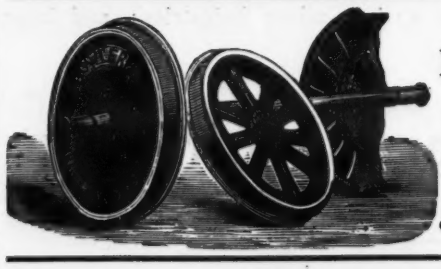

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CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No. 1. foundry, $16 50@17 00; Southern Coke No. 2 Foundry, $16 00@16 50; Southern Coke No. 3 Foundry, $15 50@16 00; Southern Coke No 1, Softeners, $16 00@16 50; Southern Coke No. 2, Softeners, $15 00@15 50; Ohio Silveries No. 1, $18 25@18 75; Ohio Silveries No. 2, $17 25@ 17 75; Ohio Strong Softeners No. 1, $19 00@19 50; Ohio Strong Softeners No. 2, $18 25@18 75; Lake Superior Charcoal Nos. 1 to 6, $19 50@20 50; Tennessee Charcoal No. 1, $19 50@20 00; Tennessee Charcoal No. 2, $19 00@19 50; Southern Standard Car Wheel, $24 00@25 00; Tennessee Standard Car Wheel, $20 00@20 50.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $15 50@16 00; Hanging Rock Coke, No. 1 foundry, $17 50@18 50; Jackson Co. Stone Coal, No. 1 foundry, $17 00@17 50; Tennessee Charcoal, No. 1 foundry, $17 50@18 00; Hanging Rock Charcoal, No. 1 foundry, $21 00@22 00. MILL IRONS—Standard Southern Coke, grey forge, $13 50@14 00; Standard Southern Coke, mottled, $13 00@13 50; Cold Short Southern Coke, grey forge, $13 00@13 50; Strong Ohio Neutral Coke, grey forge, $16 00@16 50. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $22 50@23 00; Tennessee Car Wheel, $20 50@21 50; Lake Superior Car Wheel, $21 50@22 50.

BUFFALO (reported by Rogers, Brown & Co.): Mahoning and Shenango Valley strong, No. 1 Foundry, $18 25@18 50; Mahoning and Shenango Valley strong, No. 2 Foundry, $17 25@17 50; Niagara No. 1, $00 00@00 00; Niagara No. 2, $00 00@00 00; Niagara No. 3, $00 00@00 00; Ohio Softener No. 1, $18 25@18 50; Ohio Softener No. 2, $17 25@18 25; Lake Superior Charcoal, $20 00@00 00; Tennessee Charcoal, $19 50@00 00; Southern Softener No. 1, $16 75@00 00; Southern Softener No. 2, $15 75@00 00; Southern Strong No. 1 Foundry, $17 75@00 00; Southern Strong No. 2 Foundry, $16 75@00 00; Alabama Car Wheel, $24 00@00 00; Hanging Rock Charcoal, $23 00@24 00.

LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $15 00@15 25; Southern coke No. 2, $14 25@14 50; Southern coke No. 3, $14 00@14 25; Mahoning Valley (Lake ore mixtures), $17 75@18 75; Southern charcoal, No. 1, $17 00@17 50; Southern charcoal, No. 2, $16 50@17 00; Missouri charcoal, No. 1, $18 00@18 50; Missouri charcoal, No. 2, $17 00@17 50. FORGE—Neutral coke $13 75@14 00; Cold short, $13 75@14 00; Mottled, $12 75@13 25. CAR WHEEL AND MALLEABLE—Southern (standard brands), $22 00@23 00; Southern (other brands), $18 00@19 00; Lake Superior, $22 50@23 00.

ST. LOUIS (reported by Rogers, Meacham & Shields): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $16 25@16 50; Southern Coke No. 2, $15 25@15 50; Southern Coke No. 3, $14 75@15 00; Southern Grey Forge, $14 25@14 50; Southern Charcoal No. 1, $18 00@18 50; Southern Charcoal No. 2, $17 00@17 50; Missouri Charcoal No. 1, $17 00@17 50; Missouri Charcoal No. 2, $16 25@16 75; Ohio Softeners, $18 00@19 50. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $22 00@22 50; Southern, $19 00@22 50. CONNELLSVILLE COKE—East St. Louis, $5 65; St. Louis, $5 80.

DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $20 50@21 00; Lake Superior (coke) Bessemer, $20 00@20 50; Katahdin (Maine charcoal), $24 00@25 00; Lake Superior Coke, Foundry, all ore, $19 25@20 75; Lake Superior Coke, Foundry Cinder Mixed, $00 00@00 00; Standard Ohio Black Band, $00 00@00 00; Southern No. 1, $17 00@17 50; Southern Gray Forge, $15 25@15 50; Jackson County (Ohio) Silvery, $19 00@19 50; Old Car Wheel, $02 00@00 00.

LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry $14 75@15 25; Southern Coke No. 2 Foundry $14 25@14 75; Southern Coke No. 3 Foundry $13 75@14 25; Grey Forge, $13 25@13 75; Southern Coke Silver Grey, $14 00@15 00; Southern Charcoal No. 1 Foundry, $17 50@18 50; Southern Car Wheel, Standard brands, $22 50@23 50.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $17 50@17 75; No. 2 Foundry, $16 50@16 75; Grey Forge, $15 50@15 75; White and Mottled, $14 50@14 75; Warm Blast Charcoal, $19 00@22 00; Cold Blast Charcoal $23 00@29 00; Bessemer, $19 00@19 25.

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1¼ to 4 by ⅜ to 1 inch	1 85
4¼ to 6 by ⅜ to 1 inch	1 95
1¼ to 6 by 1¼ to 2 inch	2 25
1¼ & 1⅜ by ⅜ to ¾ inch	1 95
1 & 1¼ by ⅜ to ¾ inch	2 05
⅝, ¾ and ⅞ by ⅜ to ⅝ inch	2 25

Round and Square.

1 to 1⅜ inch	1 85
2 to 2⅜ inch	2 05
2¼ to 3¼ inch	2 35
3⅜ to 4 inch	2 85
4¼ to 4½ inch	3 35
4¾ to 5 inch	3 55

Oval.

⅜ to 1¼ inch	2 25
⅜ to ¾ inch	2 45
⅞	2 65
1	3 05

Half Oval and Half Round.

1¼ to 3 inch	2 95
⅜ to 1¼ inch	2 55
⅜ to ¾ inch	3 15
⅞	3 35
1	4 85

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	2 05
1 to 1¾ by ¼ and 5-16 inch	2 15
⅜ to ⅞ by ¼ and 5-16 inch	2 35
⅛ to ⅜ by ¼ and 5-16 inch	2 85

Hoops.

1¼ to 4, Nos. 13 to 15	2 65
1¼ to 2, Nos. 16 to 18	2 75
1¼ to 2, No. 19	2 85
1¼ to 2, No. 20	2 95
1¼ to 2, No. 21	3 05
1¼ to 2, No. 22	3 15
15-16, 1 and 1¼, Nos. 13 to 15	2 85
15-16, 1 and 1¼, Nos. 16 to 18	2 95
15-16, 1 and 1¼, Nos. 19 and 20	3 05
15-16, 1 and 1¼, No. 21	3 15
15-16, 1 and 1¼, No. 22	3 25
⅞, Nos. 13 to 15	3 05
⅞, Nos. 16 to 18	3 15
⅞, Nos. 19 and 20	3 25
⅞, No. 21	3 35
⅞, No. 22	3 45
13-16, Nos. 13 to 15	3 25
13-16, Nos. 16 to 18	3 35
13-16, Nos. 19 and 20	3 45
13-16, No. 21	3 55
13-16, No. 22	3 65
¾, Nos. 13 to 15	3 35
¾, Nos. 16 to 18	3 55
¾, Nos. 19 and 20	3 65
¾, No. 21	3 75
¾, No. 22	3 85
11-16, Nos. 13 to 15	3 55
11-16, Nos. 16 to 18	3 75
11-16, Nos. 19 and 20	3 85
11-16, No. 21	3 95
11-16, No. 22	4 05
⅝, Nos. 13 to 15	3 85
⅝, Nos. 16 to 18	4 05
⅝, Nos. 19 and 20	4 15
⅝, No. 21	4 25
⅝, No. 22	4 35
⅝, No. 23	4 55

Light Band.

1¼ to 6 by ⅛ to 3-16 in	2 25
1¼ to 6 by Nos. 11 and 12	2 35
1 to 1¾ by ⅛ to 3-16 in	2 45
1 to 1¾ by Nos. 11 and 12	2 55
⅞ and 13-16 by ⅛ to 3-16 in	2 75
⅞ and 1 3-16 by Nos. 11 and 12	2 85
¾ and 11-16 by ⅛ to 3-16 in	3 05
¾ and 11-16 by Nos. 11 and 12	3 15
⅝ and 9-16 by ⅛ to 3-16 in	3 35
⅝ and 9-16 by Nos. 11 and 12	3 45
½ by ⅛ to 3-16 in	3 65
½ by Nos. 11 and 12	3 75

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¾ inch, beveled edge, by Nos. 11 and 12	2 85
¾ inch, " " " 13 and 14	3 05
¾ inch, " " " 11 and 12	3 15
¾ inch, " " " 13 and 14	3 35

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No. 10 to 14	2 65
No. 15 to 17	2 80
No. 18 to 21	3 00
No. 22 to 24	3 20
No. 25 to 26	3 35
No. 27	3 45
No. 28	3 55

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 80
C No. 1, " "	3 05
C H No. 1 " "	3 30
C H Flange, " "	4 05
Extra Flange, "	4 55
Solid Fire Box "	5 30

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Tank	3 00
Shell	3 40
Flange	3 70
Marine Flange	4 10
Fire Box	4 80

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⅜ to 11-16 and 4¼	10¾
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3-6 in	14

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2 to 9-16 wide by 2 to ⅛ thick	0

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Hoop and band iron	9 00
Sheet iron	10 00
Wrought drillings	11 00
Malleable iron	10 00
	GROSS TONS
Old iron T rails	24 0
Old steel rails	19 5
Old car wheels	18 50
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No. 1 H. red Brass	11
Heavy yellow brass	8¼
Light yellow brass	6
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Heavy Lead	3¼

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" " " extra.....dis 60&5@60&10
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard.dis 60&10
Shultz Raw Hide Leather Belting, single, ...dis 40
Shultz Raw Hide Leather Belting, double, and Light Double.....dis 40
Standard, oak tanned.....dis 50@60
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.,.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 9¼@10¼

Chalk.

White .....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill .....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" " Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3¼

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¼".....dis 50&10
Morse Taper and Straight shank Larger than 1¼".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
½ kegs ₩ lb	4¼c	5¼c		2¾c
¼ kegs ₩ lb	4½c	5½c		3 c
10 lb cans, 10 in case	6 c	6¾c		5 c
10 lb cans, less than 10	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@5 &5

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10
Industry File Works, hand cut.....dis 50

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	3⅛
Hexagon	15⅝	11⅜	8⅛	6	5⅜	5⅛	5
Washers	9	8	7	5	4½	4⅛	4⅛

In lots less than 100 lbs, ₩ lb add ½c., lb boxes add 1c to list.

Nails (wire.)

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate { Car lots.....$2.30 / Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 70@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12@24
Excelsior Rubber.....₩ lb 24

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ¼ inch and over.....₩ lb 15¾
Sisal, ¼ inch and over .....₩ lb 13¾

Sand Paper.

B. A. & Co.....dis 45@50
H. H. Barton's.....dis 40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 45
" Band.....dis 20
" Scroll .....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 20
Atkins' Circular Saws.....dis 50
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 23c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Screws.

Wood Screws—List Jan 27, 1889.

Flat head iron.....dis 50
Round head iron.....dis 40
Flat head brass.....dis 45
Round head brass.....dis 35
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 30
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2¼ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ⅜ lb Balls		21c@29c
No. 18 " " ¼ and ⅜ "		18c@28c
No. 36 " " ¼ and ⅜ "		16c@27c
2-Ply Hemp, ¼ & ⅜ lb Balls (Spring Twine)		11½c
3-Ply " 1 lb Balls		12@12½c
3-Ply " 1½ lb Balls		11@11½c
Cotton Wrapping, 5 Balls to lb		15@16c

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 10@15
Howard.....dis 30

Wire.

	New List, Jan. 18, 1884
Brass and copper	dis 20@25
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis 65&5
Tinned market Nos. 0 to 18	dis 67½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
Annealed Fence, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 10 to 14	dis 75
Stub's Steel Wire regular	$6.00@lb dis 30

Wrenches.

Coe's genuine, cash in ten days.....dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 5
Bemis & Call's Combination.....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 10
William's " " .....dis 10
Alligator " " .....dis 40

Improved Screw Cutting FOOT AND POWER **LATHES**

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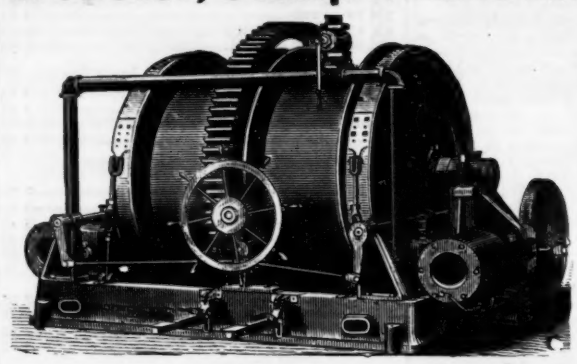

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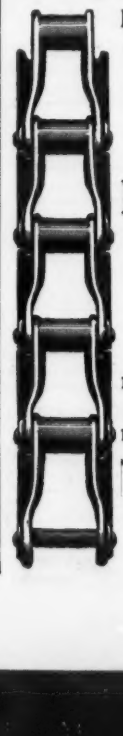

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For handling materials of all kinds.

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Water, Dairy, Fire and Chamber Pails, Wash-Basins, Spittoons, Slop Jars, Mats, Etc., are

USED BY EVERYBODY

who knows its merits, because it is

Handsome, Cleanly, Durable,

and is made from Flax Fibre, in styles plain and decorated, white and colored, and is

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SEND FOR CATALOGUES.

HARDWARE MARKET.

Augers and Bits.

Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ℔ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ℔ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....℔ doz $8 00
Others.....℔ doz $7 00
Full polished.....℔ doz $9 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 70&10&7½
Tire, common, new list.....dis 70
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&5
Loose joint, jap.....dis 70&5
Loose joint, jap. with acorns.....dis 7c&5
Loose pin, acorns.....dis 70&5
Loose pin, japanned acorns.....dis 7c&5
Loose pin, acorns, jap. plated tips.....dis 70&5
Wrought steel—
Wrought, fast joint, narrow.....dis 70&5
Wrought, fast joint, broad.....dis 7c&5
Wrought, loose joint, broad.....dis 7c&5
Table Butts, back flaps, etc.....dis 70&5
Regular inside blind.....dis 7c&5
Light inside blind.....dis 70&5
Loose pin.....dis 70&5
Light loose pin.....dis 7c&5

Chains.

Revised List.

Trace, 6¼-10-2.....℔ pair 1.03
Trace, 6¼-10-3.....℔ pair .92 .....50&10
Trace, 7-10-2.....℔ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....℔ 05½@6
Jack Chain, Iron.....dis 75@75&5
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt	$4 00	$4 50	$.....
Dairy, 14 qt	4 50	5 00	.....
Fire 12 qt	5 00	...	.....
Sugar	6 00	6 50	.....
Horse	.....	5 00	.....
Buggy	4 00	.....	.....
Chamber } Slop } Commode } 5 and 5X 14 qt.	6 50	7 50	8 50
Jars, slop, 5 and 5X 14 qt	8 00	9 00	10 00
Basins, wash—			
10½ inch	2 00	2 25	.....
12 inch	2 25	2 75	3 25
13½ inch	2 75	3 25	3 75
15 inch	3 25	3 75	4 25
Bowls, fruit	.....	2 50	.....
Servers, 12 in	.....	2 25	.....
Baskets, waste paper, 13 in	.....	6 00	.....
Spittons, "Daisy," pressed 8 inch	4 00	4 50	5 00
10 and 11½ inch	6 00	6 50	7 50

No. 1 plain; No. 5 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....℔ gross $12, dis 25@25&5

Hangers.

Barn door, old patterns.....dis 50&10&10@70
Climax, (Anti-Friction).....dis 60
Scranton.....dis 40
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 50&10
Richard's.....dis 30@30&10

Horse Nails.

	No. 10	9	8	7	6	
Ausable, ℔ M..	23	24	25	26	28	dis 25&10
Putnam, ℔ M..	18	19	20	21	23	dis 15
Essex						dis 25&10

Horse Shoes.

Burden, at factory.....℔ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....℔ keg $4 00
Mule Shoes, at factory.....℔ keg $5 00

Knobs.

Carriage, japanned.....℔ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hematite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbear, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60
Escutcheons and keys.....dis 60
Padlocks and padlock keys.....dis 66⅔
Bell pulls, mineral, porcelain and jet.....dis 60
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze....dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....℔ gross $4.80

Plumbs and Levels.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....℔ doz $6 00
Bishop's O K.....℔ doz $5 25
Bishop's Pioneer.....℔ doz $3 75
Bishop's American.....℔ doz $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@$....dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....℔ gross $15 00

Scales.

Hatch, Counter, No. 171.....℔ doz $21 00
Hatch, Tea, No. 161.....℔ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....℔ dos $18 dis 25

Squares.

Steel and iron } Nickel plated } dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.

American iron carpet tacks all kinds dis 70&10&10
Steel carpet tacks all kinds.....dis 70&10&10
Swedes iron carpet tacks, all kinds dis 70&10&10
Swedes iron tacks.....dis 70&10&10
Swedes iron Upholsterers' tacks..dis 70&10&10
Tinned Swedes iron tacks.....dis 70&10@10
Tinned Swedes iron Upholsterers' tacks.....dis 70&10&10
American iron cut tacks.....dis 67½&10&10
Copper tacks.....dis 50
Copper finishing and trunk nails.....dis 50&00
Cigar box nails.....dis 45&10
Finishing nails.....dis 65
Hungarian nails and miners' tacks.dis 62½&5
Gimp and lace tacks.....dis 70&5
" " " tinned.....dis 66&10
Trunk and clout nails.....dis 66⅔
Tinned trunk&clout nails.....dis 66&10&10
Basket nails.....dis 66&10&10
Chair nails.....dis 66&10&10
Common and patent brads.....dis 66&10&10

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LOW PRICES.
Planing, Matching, Molding, Tenoning, Mortising, Boring, Shaping, Carving, Etc.
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The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month; the double dagger (‡) once in three weeks.

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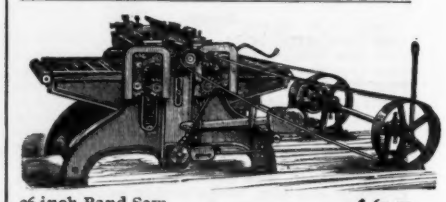

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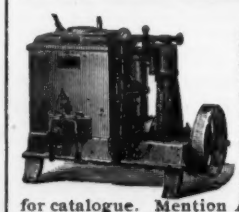

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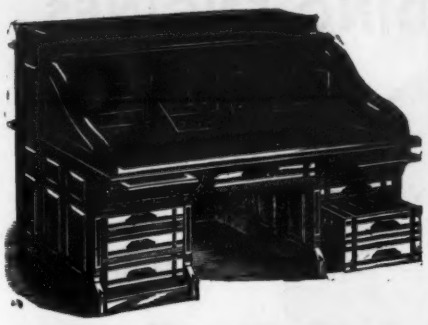

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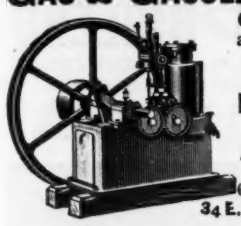

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Mahoning Accommo.....		†6 40 a m
Pittsburgh Express.....	†6 25 p m	
Youngstown Local.....	†8 05 a m	
Mahon'g div. & Pitts Local		*11 40 a m
Mahoning Val. Accom.....		†4 30 p m
Pittsburgh Express.....	†1 20 p m	11 10 p m
New York Express.....	*8 00 p m	.....

*Daily. †Daily, except Sunday. ‡Daily except Monday.

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(Standard Gauge.)

Depart for—
Zanesville and Coshocton—6:50 a. m., 3:00 p. m.
Canton—6:50 a. m., 3:00 p. m., 6:20 p. m.
Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.
Arrive from—
Zanesville and Coshocton—10:30 a. m.,6:30 p. m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.
Trains marked * run daily.

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	Depart.	Arrive.
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From Cleveland Union Station.

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	Depart.	Arrive.
For Pittsburgh, Baltimore, Washington, Philadelphia and New York.	7 45 a m	d5 25 a m
	1 15 p m	12 50 p m
	d11 10 p m	6 35 p m
Wheeling and Bellaire.	7 45 a m	12 50 p m
	1 15 p m	6 35 p m
	*11 10 p m	.....
Alliance Accom.....	3 25 p m	10 10 a m
Ravenna Accom.....	5 00 p m	8 25 a m

d Daily. * Except Saturday. Other trains except Sunday.

From Cleveland Union Station.

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	Depart.	Arrive.
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon, Columbus, Xenia, Dayton, Cincinnati, Louisville, Indianapolis, St. Louis, and all points in the South and Southwest.	8 00 a m	d 7 00 am
	d 8 00 p m	5 40 p m
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No. 66, Mantua Accommo.....	* 4 20 p m
No. 74, Youngst'n Ex.....	† 6 00 p m
No. 68, New York & Pitts. Ex.....	*11 00 p m
	Arrive.
No. 61, N. Y. & Pittsburgh Express...	† 5 15 a m
No. 71, Youngstown Accom.....	* 7 15 a m
No. 65, New York & Pitts. Lim.....	* 9 55 a m
No. 67, Pittsburgh Accom.....	*12 45 p m
No. 73, Leavitsburgh Local.....	* 2 10 p m
No. 63, New York & Pitts. Ex.....	* 6 50 p m
No, 75, Mantua Accom.....	* 7 20 p m
No. 69, Youngstown Express.....	† 9 10 p m

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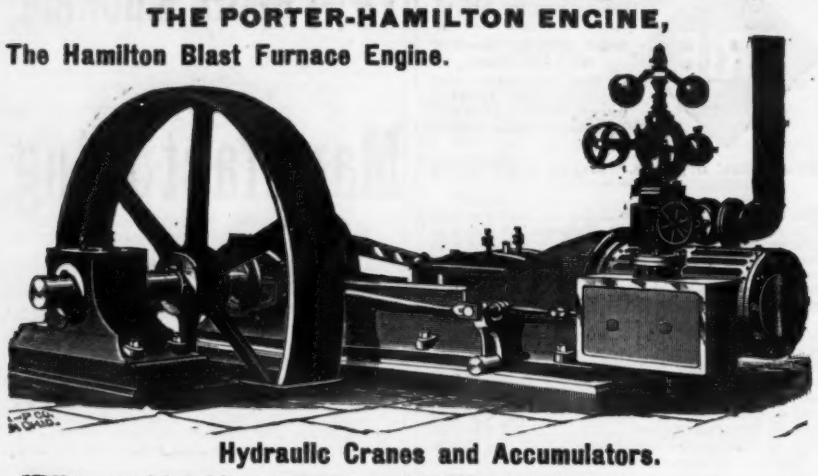

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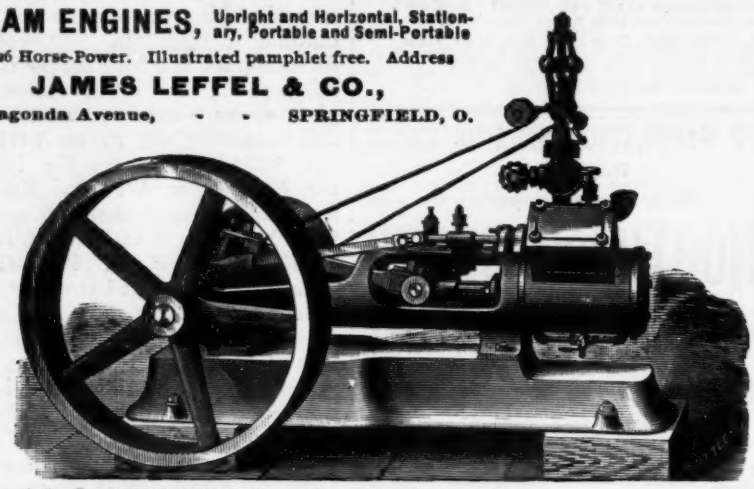

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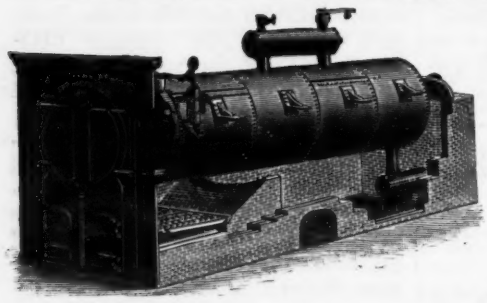

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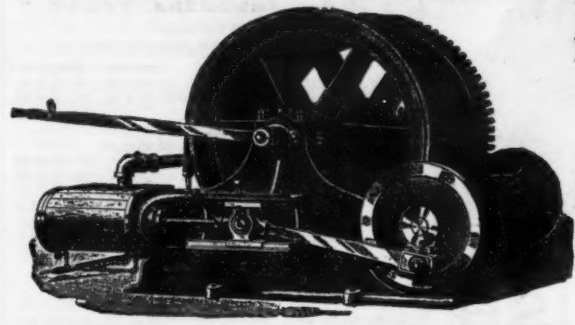

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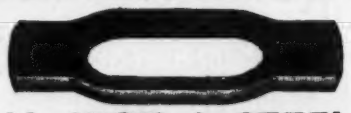

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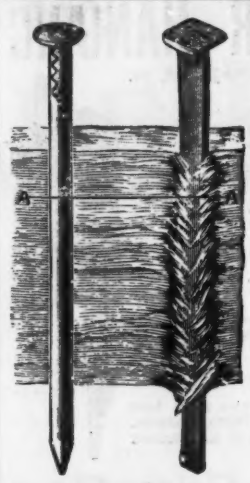

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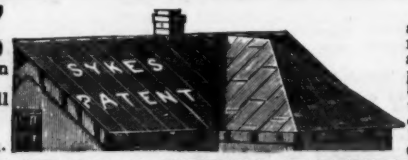

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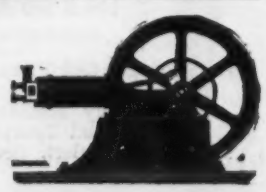

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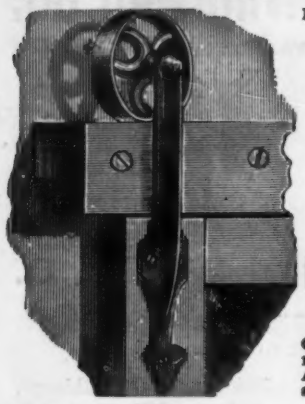

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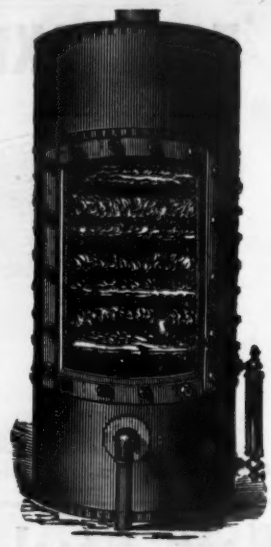

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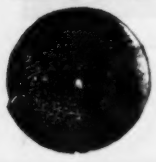

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